1.0 TITLE AND APPROVAL PAGE

Quality Assurance Project Plan Acceptance

Penobscot River Dioxin, Furan, and PCB Distribution and Occurrence Quality Assurance Project Plan

Document Title

Bureau of Indian Affairs

Lead Organization

Robert Dudley/USGS Engineer/Water Resources Division

Preparer's Name and Organizational Affiliation

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Preparer's Address and Telephone Number

November 17, 2000

Preparation Date

DOCUMENT CONTROL NUMBER

Investigative Organization Signatures:

Investigative Organization's Project Manager:

Signature: Allen Sedik/BIA CERCLA Coordinator

Investigative Organization's Project QA Officer:

Signature: Carl Orazio/USGS Biological Resources Division

Investigative Lead Organization's Project Officer:

Signature: Robert Lent/ USGS Water Resources Division

Approval Signatures:

EPA Quality Assurance Officer:

Signature: Patrice Svetaka

EPA Project Officer:

Signature: Valerie Ferry

2.0 TABLE OF CONTENTS

2.1 LIST OF SECTIONS

2.2 LIST OF TABLES AND ATTACHMENTS

2.3 LIST OF FIGURES

2.4 EPA-NE QAPP WORKSHEET #2

Project Name: Penobscot River Dioxin, Furan, and PCB Distribution and Occurrence Study.

Site Location: Penobscot River, Maine

1. Identify Guidance to prepare QAPP: Region I, EPA-NE Comp. QAPP Guidance Attachment: Draft September 1998
2. Identify EPA Program: EPA Region I Indian Program
3. Identify approval entity: EPA Region I
4. Project Specific QAPP
5. Scoping meeting dates: 4/20/99, 6/29/99, 7/20/99, 8/3/99, 8/18/99
6. QAPP dates and titles of previous site work:

   Penobscot River Sediment Evaluation June 1997
7. List of organizational partners:

   BIA, USGS, PIN DNR, ATSDR
8. List Data users:

   EPA-NE Risk Assessors, BIA, PIN Department of Natural Resources, ATSDR
9. QAPP Elements not applicable to the project:

   4.4 No specialty training is necessary to conduct fieldwork for this project (sediment and fish sampling).

   11.0 Field analytical methods are not required since no field analyses will be performed to samples.

   13.2.1 No Field analytical QC is required since no field analyses will be performed to samples.

   See attached tabular worksheets in Appendix A regarding above items.

3.0 DISTRIBUTION LIST

QAPP Recipients	Title	Organization	Tel.	Doc.Cont.#
Allen Sedik	BIA Project Manager	US BIA	202-208-5474	PENOB9101
Valerie Ferry	EPA Project Manager	US EPA-NE	617-918-1674	PENOB9102
Patrice Svetaka	EPA QA Officer	US EPA-NE	781-860-4396	PENOB9103
Dan Kusnierz	PIN Water Res. Project Mgr	PIN Dept. Nat. Resources	207-827-7776	PENOB9104
Therese Anderson	Lab Manager	Water Research Institute	207-581-3287	PENOB9105
Carl Orazio	USGS Project QA Officer	US Geological Survey, BRD	573-876-1823	PENOB9106
Ann-Marie Burke	Human Health Risk Assessor	US EPA-NE	617-918-1237	PENOB9107
Patti Lynne Tyler	Ecological Risk Assessor	US EPA-NE	781-860-4342	PENOB9108
Steve Stadola	EPA Data Validator	US EPA-NE	781-860-4634	PENOB9109
Robert Lent	USGS Project Manager	US Geological Survey, WRD	207-622-8202	PENOB9110
Dana Abouelnasar	Risk Assessor	ATSDR	404-639-0790	PENOB9111
Phil Cook	Risk Assessor	EPA, Duluth, MN	218-529-5202	PENOB9112
Don Tillit	Risk Assessor	US Geological Survey, BRD	573-875-5399	PENOB9113

3.1 PROJECT PERSONNEL SIGN-OFF SHEET

3.1.1 ORGANIZATION: UNITED STATES GEOLOGICAL SURVEY

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read	QAPP Acceptable as Written
Robert Lent	Project Officer	207-622-8201			
Robert Dudley	Field Team Leader	207-622-8201			
Carl Orazio	Project QA Officer	573-875-5399			
Sarah Giffen	Field Tech.	207-622-8201			

Note: *Copies of this form must be signed by Project Personnel from each organization to indicate that they have read the QAPP and will implement the QAPP as prescribed. Signed sheets should be forwarded to the Central Project File of the lead organization and made available to EPA-NE upon request.*

3.1.2 ORGANIZATION: UNIVERSITY OF MAINE-WATER RESEARCH INSTITUTE

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read	QAPP Acceptable as Written
Therese Anderson	Lab Manager	(207) 581-3287			
Sharon Sneed	Lab Tech.	(207) 581-3287			
Richard Dill	Lab Tech.	(207) 581-3287			
Dina Page	Lab Tech	(207) 581-3287			

Note: *Copies of this form must be signed by Project Personnel from each organization to indicate that they have read the QAPP and will implement the QAPP as prescribed. Signed sheets should be forwarded to the Central Project File of the lead organization and made available to EPA-NE upon request.*

3.1.3 ORGANIZATION: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

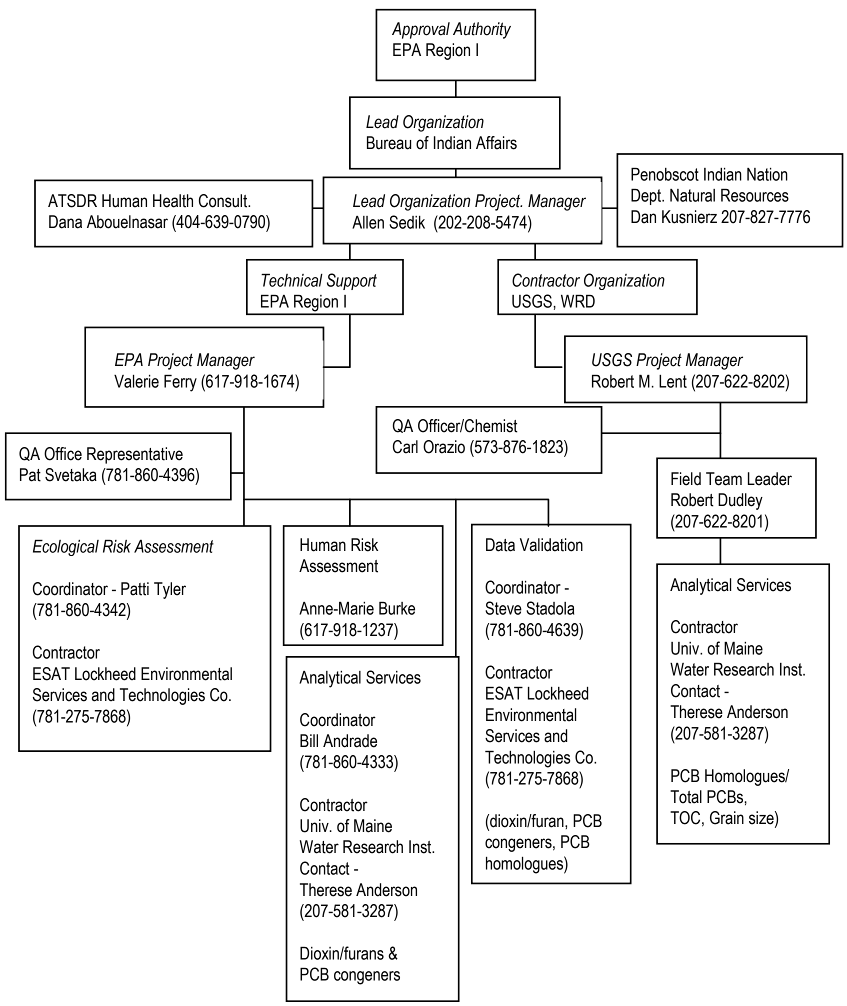
Project Personnel	Title	Telephone Number	Signature	Date QAPP Read	QAPP Acceptable as Written
Steve Stadola	Data Validator	781-860-4634			
Valerie Ferry	EPA Program Officer	617-918-1674			
Pat Svetaka	EPA QA Officer	781-860-4396			

Note: *Copies of this form must be signed by Project Personnel from each organization to indicate that they have read the QAPP and will implement the QAPP as prescribed. Signed sheets should be forwarded to the Central Project File of the lead organization and made available to EPA-NE upon request.*

4.0 PROJECT ORGANIZATION

4.1 PROJECT ORGANIZATIONAL CHART

FIGURE 4.1 PENOBSCOT RIVER DIOXIN, FURAN, AND PCB DISTRIBUTION AND OCCURRENCE STUDY ORGANIZATIONAL CHART



4.1.1 COMMUNICATION PATHWAYS

The USGS Field Sampling Leader will report daily or as needed by telephone to the USGS Project Manager. Modifications to field procedures will be approved by EPA through channels illustrated in Figure 4.1 prior to implementation in the field. The USGS Project Manager will report as needed (via phone, email, fax, letter) to the Lead Organization Project Manager and the EPA Project Manager as needed.

The USGS Field Sampling Leader will also be the primary contact between the sampling crew and the laboratory. The USGS Field Sampling Leader will be in direct contact with the laboratory on a daily basis (by telephone or in person) to notify the laboratory of the sample delivery schedule, as well as to answer any questions (should they arise) related to those samples and chain-of-custody forms delivered.

The USGS QA Officer will provide internal technical review of the QAPP prior to submittal to EPA and BIA to ensure that it follows all appropriate protocols. Once this is ensured, The USGS QA Officer will note their approval of the document by signing the title and approval page. In addition, the USGS QA Officer defers to the USGS Project Manager (or another qualified person identified by the USGS Project Manager), as his representative for conducting all field assessments. This person will be responsible for identifying any deficiencies and non-conformances in the field plan and field sampling protocols, implementing the appropriate corrective actions, and notifying the Lead Organization Project Manager and EPA Project Manager of these activities.

For analytical services contracted by USGS, all questions associated with analytical procedures and QA will be addressed directly to the USGS QA Officer/Chemist. Analytical services contracted directly by EPA will be addressed to Bill Andrade. Bill will contact Pat Svetaka, who will in turn contact Valerie Ferry, regarding any project issues. Steve Stadola will be the contact person for data validation to be conducted by ESAT Lockheed Environmental Services and Technologies Company. Data validation/evaluation of the TOC and grain size analysis will be conducted by USGS with guidance from the EPA.

No data may be released to the public until 1 year following delivery of all data obtained from all field samples to the risk assessors.

Any deviations from schedule, field plan, or analytical procedures will be reported from the originating organizational unit to the next highest organizational unit shown in Figure 4.1.

4.1.2 MODIFICATIONS TO APPROVED QAPP

All lead and contractor organizational contacts provided in section 4.1 have authority to initiate modifications to the QAPP. The initiating organization will provide the proposed modifications to the next highest organizational unit, if any, who will submit the proposed modifications to appropriate EPA QA/QC reviewers for approval.

4.2 PERSONNEL RESPONSIBILITIES AND QUALIFICATIONS

TABLE 4.2 PROJECT PERSONNEL AND QUALIFICATIONS

Name	Title	Affiliation	Responsibilities	Location of Personnel Resumes if not incl.	Education & Experience
Robert Lent	USGS Project Manager	USGS, WRD	Oversees field sampling QC and procedures. Liaison between contract organizations.	Appendix B	See attached
Robert Dudley	USGS Field Team Leader	USGS, WRD	Leads field activities, mapping, data assembly, and report writing	Appendix B	See attached
Sarah Giffen	USGS Field Tech.	USGS, WRD	Leads database construction, participates in field activities, report writing	Appendix B	See attached
Carl Orazio	USGS QA Officer	USGS, BRD	Oversees and reviews lab QA and analytical procedures	Appendix B	See attached
Therese Andersen	WRI Lab Manager	WRI, UMO	Laboratory manager, oversees QC and analytical procedures	Lab QAP in Appendix C	See attached
Sharon Sneed	WRI Lab Tech.	WRI, UMO	Performs sample handling and analyses	Lab QAP in Appendix C	See attached
Dina Page	WRI Lab Tech.	WRI, UMO	Performs sample handling and analyses	Lab QAP in Appendix C	See attached
Richard Dill	WRI Lab Tech.	WRI, UMO	Performs sample handling and analyses	Lab QAP in Appendix C	See attached

5.0 PROJECT PLANNING/ PROJECT DEFINITION

5.1 PROJECT SCOPING MEETINGS ATTENDANCE AND AGENDAS

20 APRIL 1999

Meeting Agenda:

Location: Water Resources Division, USGS, Maine District

Time (Eastern Std Time)

1000 Introduction

Overall QAP objectives

Geophysical survey

Sediment sampling for TOC analyses

1100 Conference Call - USGS will call the following numbers:

Don Tillitt & Carl Orazio (BRD, MO) (573) 876-1823

Phil Cook (EPA, MN) (218) 529-5202

1100— Develop QAP—Dioxin Analyses

Site Selection—Sediment and Fish

Background site(s)

Upstream/downstream key locations (impoundments, etc.)

Tributaries

Fish habitat or coincidence with sediment stations

Other?

Sampling Strategy—Sediment and Fish

Composite vs. single

Depth of sediment sample (surficial vs. composite)

Sampling Methodology

<u>Sediment</u>

Sampler type (Ekman/core)

Volume of sediment required

Cleaning procedures

Other?

<u>Fish</u>

Collection technique

Species

Cleaning procedures

Number of fish

Other?

Sample Processing—Sediment and Fish

Subsampling

Containers (glass/plastic/teflon)

Shipping

Preservation (chill/chemical)

Other?

Chain of Custody

Include Coplanar PCB's?

1300-1400 Wrap-up

Meeting Attendance

Dan Kusnierz – PIN DNR Water Prog. Manager

Ray Thompson – EPA Lexington lab, QW monitoring coordinator

Patty Tyler – EPA Lexington, Aquatic Biologist, Ecological Risk Assessor

Arthur Clark – EPA Lexington, QA Office

Glenn Hodgkins – USGS, WRD

Robert Dudley – USGS, WRD

Carl Orazio – USGS, BRD, Columbia, MO Lab

Phil Cook – EPA, Duluth MN, Dioxin Ecological Risk Assessor

29 JUNE 1999

Agenda

Location: Old Town, Penobscot Indian Reservation, Community Center

Overview (Mark Barash)

Remedial Action

Natural Resources Damages

Focus Upon Sediment

Context for Clean-up: Sediment

Context for Recovery of Damages

Trustee Coordination Issues

Sediment Work (Jeff Loman/Bob Lent/Dan Kusnierz)

EPA Role (Jeff Loman/Jean Rice/Mark Audet or other EPA)

Meeting Attendance

John Banks – PIN DNR Director

Jean Rice – DOI Solicitors Office

Matt Audet – EPA Superfund

Jeffery Loman – BIA OTR

Valerie Ferry – EPA Indian Program

Darren Ranco – EPA Tribal Liaison

Mark Barash – DOI Solicitors Office

John Duffield –Montana

James Sappier – EPA Indian Program

Dan Kusnierz – PIN DNR Water Prog. Manager

Kaighn Smith – PIN DWM

Mark Chavaree - PIN

Robert Lent – USGS, WRD

Robert Dudley – USGS, WRD

20 JULY 1999

Penobscot River Dioxin, Furans, and PCB Occurrence and Distribution Study-QAP

Location: Water Resources Division, USGS, Maine District

Conference Call to join meeting at USGS office in Augusta, Maine

Conference Call Number: 202-260-8330 code 9075#

AGENDA

10:00 Introductions

10:15Discuss responsibilities, participation, and lead scientists for fish/sediment sampling:

EPA

USGS

ATSDR

PIN, DNR

11:15 Discuss data required by risk assessors for QAPP development:

Ecological

Human health

12:00 Lunch

1:00 Participating laboratories - who and what analyses.

Dioxin

Furans

PCBs

CERCLIS

2:00 End

Meeting Attendance

***At USGS Office

Patrice Svetaka, EPA Supervisory QAPP Reviewer

Arthur Clark, EPA QAPP Reviewer

Patrice Svetaka, EPA QAPP Reviewer

Anne-Marie Burke, EPA H.H. Risk Assessor

Ray Thompson, EPA

Dan Kusnierz, PIN DNR Program Manager

Valerie Ferry, EPA Indian Prog.

Robert Lent – USGS, WRD

Robert Dudley – USGS, WRD

Darren Ranco, EPA Indian Liaison

***On Conference Call:

Phil Cook, EPA Duluth, MN

Carl Orazio, BRD, MO

Patty Tyler, EPA Risk Assessor

Dana Abouelnasar, ATSDR Risk Assessor

Jim Sappier, EPA Indian Program

3 AUGUST 1999

Meeting Agenda:

Location: Water Resources Division, USGS, Maine District

Discuss use of Maine Water Research Institute for all analyses

Established BIA as lead agency

Sample fine grained materials in wadeable waters as part of human health

Established project objective as human health & ecological risk assessment

Meeting Attendance

Andy Beliveau-- EPA Lexington, QA Office

Arthur Clark – EPA Lexington, QA Office

Mark Chavaree - PIN

John Banks – PIN DNR Director

Pat Svetaka-- EPA Lexington, QA Office

Robert Lent – USGS, WRD

Robert Dudley – USGS, WRD

Dan Kusnierz – PIN DNR Water Prog. Manager

18 AUGUST 1999

Meeting Agenda:

Location: Penobscot River, Maine

Time: All day

Attendees toured stretch of river near Lincoln to observe field conditions

Discussion of sampling methods, and sample site selection

Meeting Attendance

James Sappier, EPA Indian Program

Patty Tyler, EPA Risk Assessor

Anne-Marie Burke, EPA H.H. Risk Assessor

Pat Svetaka, EPA Lexington, QA Office

Valerie Ferry, EPA Indian Prog.

Matt Audet, EPA Superfund

Jason Mitchell, PIN DNR Field Technician

Robert Dudley, USGS, WRD Maine District

Sarah Giffen, USGS, WRD, Maine District

John Banks, PIN DNR Director

Dan Kusnierz, PIN DNR Water Prog. Manager

5.2 PROBLEM DEFINITION/ SITE HISTORY BACKGROUND

The U.S. Bureau of Indian Affairs (BIA) has expressed concern with the presence of polychlorinated dibenzo-*p*-dioxins (referred to as dioxin or PCDD in this document) and polychlorinated dibenzofurans (referred to as furan or PCDF in this document) in fish and sediment in the Penobscot River between the Town of Lincoln and the Town of Old Town, Maine. Dioxin in the riverbed sediment has been quantified to a limited degree through a sampling study conducted in this area in 1995 by the Penobscot Indian Nation, Department of Natural Resources. In addition, the Maine Department of Environmental Protection (DEP) maintains four sampling stations in the study area as part of their statewide dioxin program. The BIA requires additional sampling and riverbed characterization in an effort to compliment the DEP data and more completely determine the ecological and human health risks associated with dioxins, furans, and PCBs in the study area.

The USGS will collect fish tissue and sediment samples and have the samples analyzed for dioxin, furans, and PCBs. The study area includes the Penobscot River main channel from the boat launch in Chester to the dam in Old Town, Maine including a control site upstream of the Mattaseunk Dam at Mattawamkeag (see study area map section 5.2.2) and a background site near Grindstone on the East Branch of the Penobscot River. The USGS will produce a data report describing the occurrence and distribution of the compounds in the study area. EPA risk assessors will use these data in the future to determine the ecological and human health risks associated with those compounds in the study area.

HISTORICAL DIOXIN INVESTIGATIONS

STATE OF MAINE DIOXIN MONITORING PROGRAM

The State of Maine Dioxin Monitoring Program was established in 1988 to determine the nature of dioxin (and dioxin-related coplanar PCBs) contamination in the waters and fisheries of the State of Maine. The Maine Department of Environmental Protection (DEP) administrates the program and is required to sample fish once a year below no more than 12 bleached pulp mills, municipal water treatment plants, or other known or likely sources of dioxin. Small mouth bass and white suckers are sampled. From 1988-1994, both species were sampled each year. In 1995, the program was revised so that one species is sampled at a site each year – requiring two years to complete a sampling schedule that used to occur annually. The results of all dioxin sampling (fish tissue) is published in a report to the Legislature's Joint Standing Committee on natural Resources during the following winter-early spring (sampling conducted May-September). Annual reports span 1988-1996 to date.

Based on the Dioxin Monitoring Program sampling results 1988-1995, the Maine Bureau of health posted fish consumption advisories in March 1997 which include several advisory areas where PCBs and dioxins in fish caught have been found at levels sufficient to prompt consumption advisories. The Penobscot River below Lincoln is one of the advisory areas cited for PCB and dioxin contamination. In addition, the advisory cites a General Consumption Advisory for all inland surface waters due to mercury contamination.

The 1996 dioxin sampling program found concentrations of Dioxin Toxic Equivalents (TEQ) in all fish samples collected below point source discharges on the Kennebec River, Penobscot River, Salmon Falls River, and East and West Branch of the Sebasticook River exceeded DEP's Background Fish Concentration (BFC=0.15 ppt) and greater than concentrations at reference stations unimpacted by point sources.

Further findings from the 1996 program specific to the Penobscot River indicate that the unimpacted reference site at Grindstone, just above Grindstone Falls, showed concentrations of TEQ computed by using half the detection limit for reported non-detects slightly exceeded the BFC, but concentrations of TEQ calculated with non-detects valued at zero did not, demonstrating the impact of non-detects. Concentrations of TEQ in bass at Grindstone were similar to those of the reference station on the Kennebec River at Madison. Trace amount of TEQ measured in fish at Grindstone are thought to represent long-range transport and atmospheric deposition from remote sources.

Results (1996) from South Lincoln sampling site (about 3-4 miles below Lincoln Pulp & Paper Company's bleached kraft mill) show concentrations of TEQ above the BFC. Concentrations of TEQ in bass were higher than at Grindstone and were similar to values reported in 1994. Recent data from Lincoln P&P show concentrations in effluent were similar to those in 1995, but concentrations in sludge are lower than in 1994 when last measured.

The three river reaches that have been sampled for fish or are currently on the sampling list for fish by the State of Maine, within the study area of the current project include: Grindstone, E. Millinockett, N. Lincoln, S. Lincoln, Passadumkeag, Milford/Costigan, Veazie, Bangor, Bucksport, and Stockton Springs.

PENOBSCOT INDIAN NATION, DEPARTMENT OF NATURAL RESOURCES: SEDIMENT SURVEY

A sediment evaluation project was conducted by the Penobscot Indian Nation's Department of Natural Resources in 1996 at selected areas between Chester and the Old Town Dam at Old Town.

The objectives this study were to 1) determine if there were any sediment types in the Penobscot River between Old Town and Chester that contain dioxin, and 2) determine at what concentrations dioxin occurs in those sediment types. Three areas were surveyed in particular: Orono Island, Indian Island, and the West Enfield Impoundment. Geophysical surveys were done at each location using a side-scan sonar unit identifying areas of fine to coarse sands, gravel, and rock. Sediment sampling was conducted to truth the sonar data and to obtain samples for dioxin analyses.

The dioxin data obtained from this study were summarized in a report entitled, "Penobscot Nation Sediment Evaluation Project." This report was forwarded to

Donald Tillitt at the Environmental and Contaminants Research Center (ECRC), USDOI, at Columbia, Missouri for a first cut ecological risk assessment. Dr. Tillitt assessed the hazards that polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) pose to fish and wildlife in the Penobscot River. The exposure estimates presented by the ECRC were based on the assumption that the sediments are the primary source of PCDD and PCDF contamination to fish and wildlife. The models used in the assessment are steady-state, simple additive models of the relative potencies or toxic equivalent factors (TEFs) of the various congeners in question.

Dr. Tillitt's overall assessment of the hazards of PCDD and PCDF congeners measured in the sediments of the Penobscot River to fish, bald eagles, and mink (selected species that are representative of critical food webs) was that the risk to these species was low. Dr. Tillitt also noted that, "The degree of uncertainty associated with the hazard assessment however, is such to warrant a more complete assessment of exposure and toxicity for mink/otters and bald eagles that live in these areas, which are most certainly exposed to other dioxin-like chemicals."

5.2.1 PROJECT OBJECTIVES

The project objectives are to obtain dioxin, furan, and PCB data and describe the occurrence and distribution of these compounds in the study area. The data will have an eventual use to evaluate the potential risk to human health and the environment from exposure to these compounds detected in sediments and/or fish. The project will collect and analyze representative environmental samples of sediments and fish. The field sampling design and sampling Standard Operating Procedures are included in Sections 8 and 9 of this QAPP. The QAPP defines the quality assurance objectives and procedures that will be implemented to obtain data that are useable for both the ecological risk assessment and human health risk assessment. Briefly, the objective of the ecological risk assessment is to identify whether ecological risks are likely to occur due to exposure from dioxins and furans to aquatic organisms exposed directly to sediments or indirectly through the ingestion of contaminated prey. The objective of the Human health Evaluation is to assess potential current and future risk from exposures to dioxins, furans, and PCBs from ingestion of fish and ingestion of/and dermal contact with sediments in the absence of any remedial action within the study area.

5.2.2 Site Map

The following figure illustrates the study area.

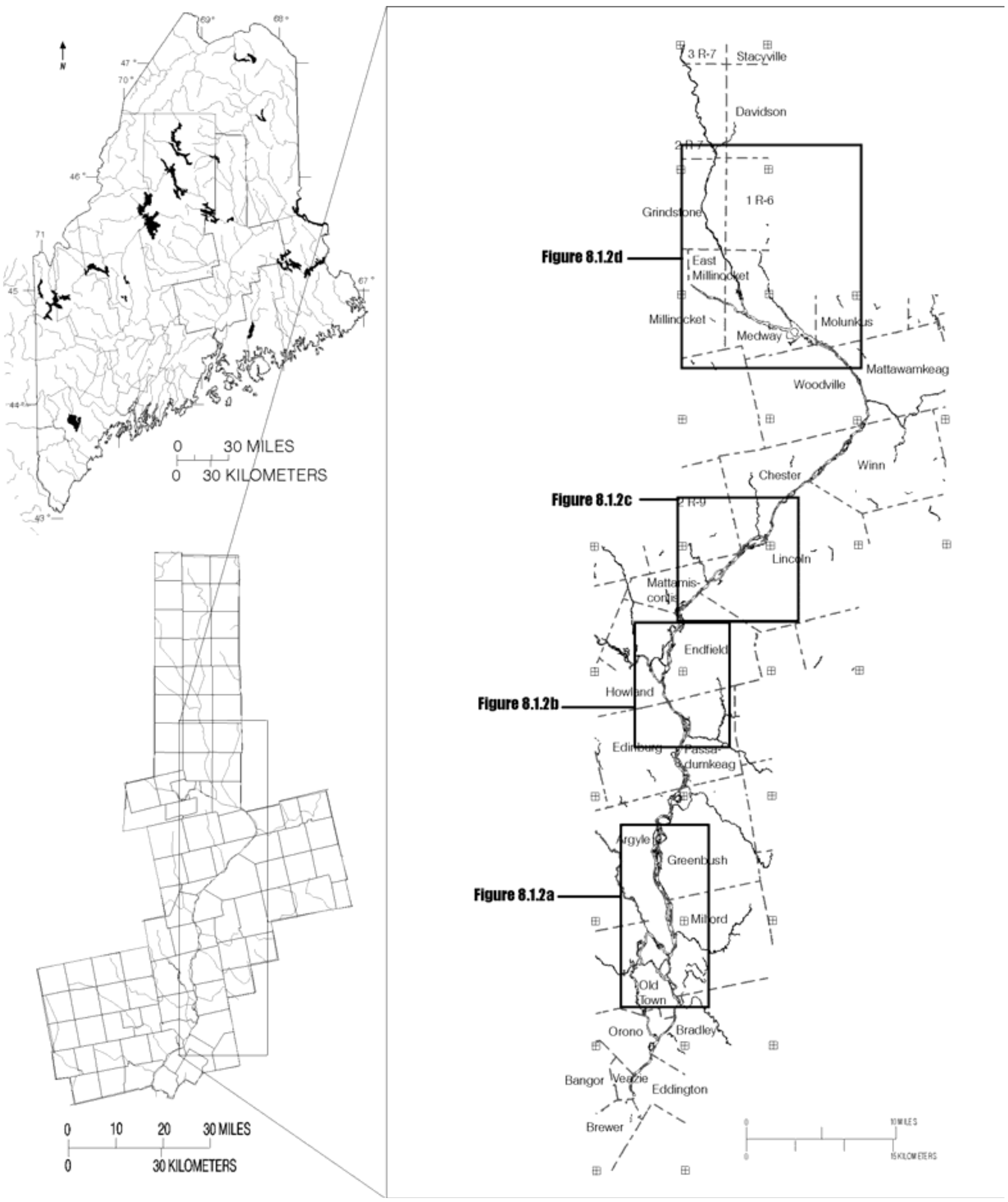


FIGURE 5.2.2 LOCATION OF PENOBSCOT RIVER STUDY AREA

6.0 PROJECT DESCRIPTION AND SCHEDULE

6.1 PROJECT DESCRIPTION/ OVERVIEW

Bureau of Indian Affairs, as the lead agency, has brought together USGS, EPA, ATSDR, and the University of Maine to assist with this project. USGS is conducting all the fieldwork for this project and will be compiling a report of the data collected. The project consists of collection of fish tissues and sediment samples to be analyzed for dioxins, furans, and PCBs. The data will be used in the future by EPA risk assessors to assess human health and ecological risk and by ATSDR for a public health consultation. The study area includes the Penobscot River main channel from the boat launch in Chester to the dam in Milford Maine including a control site upstream of the Mattaseunk Dam at Medway (See Site Map 5.2.2).

6.1.1 CONTAMINANTS OF CONCERN AND OTHER TARGET ANALYTES

TABLE 6.1.1 CONTAMINANTS OF CONCERN AND OTHER TARGET ANALYTES

FOR SEDIMENT - Ecological Evaluation				
Analyte	CAS Number	Project Action Limit ng/kg (wet weight)	Project Quantitation Limit ng/kg (wet weight)	Achievable Lab. Limits QLs solid ng/kg
DIOXINS/FURANS:				
2,3,7,8-TCDD	1746-01-6	60	6	0.1
2,3,7,8-TCDF	51207-31-9	X	X	0.1
1,2,3,7,8-PeCDD	40321-76-4	X	X	0.5
1,2,3,7,8-PeCDF	57117-41-6	X	X	0.5
2,3,4,7,8-PeCDF	57117-31-4	X	X	0.5
1,2,3,4,7,8-HxCDD	39227-28-6	X	X	0.5
1,2,3,6,7,8-HxCDD	57653-85-7	X	X	0.5
1,2,3,7,8,9-HxCDD	19408-74-3	X	X	0.5
1,2,3,4,7,8-HxCDF	70648-26-9	X	X	0.5
1,2,3,6,7,8-HxCDF	57117-44-9	X	X	0.5
1,2,3,7,8,9-HxCDF	72918-21-9	X	X	0.5
2,3,4,6,7,8-HxCDF	60851-34-5	X	X	0.5
1,2,3,4,6,7,8-HpCDD	35822-46-9	X	X	0.5
1,2,3,4,6,7,8-HpCDF	67562-39-4	X	X	0.5
1,2,3,4,7,8,9-HpCDF	55673-89-7	X	X	0.5
OCDD	3268-87-9	X	X	1.0
OCDF	39001-02-0	X	X	1.0
PCB CONGENERS (or coplanars):				
3,3',4,4'-tetrachlorobiphenyl (IUPAC# 77)	32598-13-3	X	X	0.5
2,3,3',4,4'-pentachlorobiphenyl (# 105)	32598-14-4	X	X	0.5
2,3,4,4',5-pentachlorobiphenyl (# 114)	74472-37-0	X	X	0.5
2,3',4,4',5-pentachlorobiphenyl (#118)	31508-00-6	X	X	0.5
2',3,4,4',5-pentachlorobiphenyl (# 123)	65510-44-3	X	X	0.5
3,3,4,4',5pentachlorobiphenyl (# 126)	57465-28-8	X	X	0.5
2,3,3',4,4',5-hexachlorobiphenyl (# 156)	38380-08-4	X	X	1.0
2,3,3',4,4',5'-hexachlorobiphenyl (# 157)	69782-90-7	X	X	1.0
2,3',4,4',5,5'-hexachlorobiphenyl (# 167)	52663-72-6	X	X	1.0
3,3',4,4',5,5'-hexachlorobiphenyl (# 169)	32774-16-6	X	X	1.0
3,4,4',5-tetrachlorobiphenyl (# 81)	160901-68-8	X	X	1.0
2,3,3',4,4',5,5',-heptachlorobiphenyl (# 189)	39635-31-9	X	X	1.0
PCB HOMOLOGUES:				
Total-PCBs	12767-79-2	10000	3000	5000
Total Organic Carbon	X	X	X	0.01 (%)
Grain Size	X	X	X	0.01 (g)

TABLE 6.1.1 CONTAMINANTS OF CONCERN AND OTHER TARGET ANALYTES –CONT.-

FOR SEDIMENT - Human Health Evaluation				
Analyte	CAS Number	Project Action Limit ng/kg (wet weight)	Project Quantitation Limit ng/kg (wet weight)	Achievable Lab. Limits QLs solid ng/kg
DIOXINS/FURANS:				
2,3,7,8-TCDD	1746-01-6	9	0.9	0.1
2,3,7,8-TCDF	51207-31-9	90	9	0.1
1,2,3,7,8-PeCDD	40321-76-4	9	0.9	0.5
1,2,3,7,8-PeCDF	57117-41-6	180	18	0.5
2,3,4,7,8-PeCDF	57117-31-4	18	1.8	0.5
1,2,3,4,7,8-HxCDD	39227-28-6	90	9	0.5
1,2,3,6,7,8-HxCDD	57653-85-7	90	9	0.5
1,2,3,7,8,9-HxCDD	19408-74-3	90	9	0.5
1,2,3,4,7,8-HxCDF	70648-26-9	90	9	0.5
1,2,3,6,7,8-HxCDF	57117-44-9	90	9	0.5
1,2,3,7,8,9-HxCDF	72918-21-9	90	9	0.5
2,3,4,6,7,8-HxCDF	60851-34-5	90	9	0.5
1,2,3,4,6,7,8-HpCDD	35822-46-9	900	90	0.5
1,2,3,4,6,7,8-HpCDF	67562-39-4	900	90	0.5
1,2,3,4,7,8,9-HpCDF	55673-89-7	900	90	0.5
OCDD	3268-87-9	90000	9000	1.0
OCDF	39001-02-0	90000	9000	1.0
PCB CONGENERS (or coplanars):				
3,3',4,4'-tetrachlorobiphenyl (IUPAC# 77)	32598-13-3	90000	9000	0.5
2,3,3',4,4'-pentachlorobiphenyl (# 105)	32598-14-4	90000	9000	0.5
2,3,4,4',5-pentachlorobiphenyl (# 114)	74472-37-0	18000	1800	0.5
2,3',4,4',5-pentachlorobiphenyl (#118)	31508-00-6	90000	9000	0.5
2',3,4,4',5-pentachlorobiphenyl (# 123)	65510-44-3	90000	9000	0.5
3,3,4,4',5pentachlorobiphenyl (# 126)	57465-28-8	90	9	0.5
2,3,3',4,4',5-hexachlorobiphenyl (# 156)	38380-08-4	18000	1800	1.0
2,3,3',4,4',5'-hexachlorobiphenyl (# 157)	69782-90-7	18000	1800	1.0
2,3',4,4',5,5'-hexachlorobiphenyl (# 167)	52663-72-6	900000	90000	1.0
3,3',4,4',5,5'-hexachlorobiphenyl (# 169)	32774-16-6	900	90	1.0
3,4,4',5-tetrachlorobiphenyl (# 81)	160901-68-8	X	X	1.0
2,3,3',4,4',5,5',-heptachlorobiphenyl (# 189)	39635-31-9	90000	9000	1.0
PCB HOMOLOGUES:				
Total-PCBs	12767-79-2	500000	50000	5000
Total Organic Carbon	X	X	X	0.01 (%)
Grain Size	X	X	X	0.01 (g)

TABLE 6.1.1 CONTAMINANTS OF CONCERN AND OTHER TARGET ANALYTES –CONT.-

FOR FISH - Ecological Evaluation				
Analyte	CAS Number	Project Action Limit ng/kg (wet weight)	Project Quantitation Limit ng/kg (wet weight)	Achievable Lab. Limits QLs solid ng/kg
DIOXINS/FURANS:				
2,3,7,8-TCDD	1746-01-6	6.0	1.0	0.1
2,3,7,8-TCDF	51207-31-9	120	12	0.1
1,2,3,7,8-PeCDD	40321-76-4	60	1.0	0.5
1,2,3,7,8-PeCDF	57117-41-6	120	12	0.5
2,3,4,7,8-PeCDF	57117-31-4	12	1.2	0.5
1,2,3,4,7,8-HxCDD	39227-28-6	12	1.2	0.5
1,2,3,6,7,8-HxCDD	57653-85-7	600	60	0.5
1,2,3,7,8,9-HxCDD	19408-74-3	600	60	0.5
1,2,3,4,7,8-HxCDF	70648-26-9	60	6.0	0.5
1,2,3,6,7,8-HxCDF	57117-44-9	60	6.0	0.5
1,2,3,7,8,9-HxCDF	72918-21-9	60	6.0	0.5
2,3,4,6,7,8-HxCDF	60851-34-5	60	6.0	0.5
1,2,3,4,6,7,8-HpCDD	35822-46-9	6000	600	0.5
1,2,3,4,6,7,8-HpCDF	67562-39-4	600	60	0.5
1,2,3,4,7,8,9-HpCDF	55673-89-7	600	60	0.5
OCDD	3268-87-9	60000	6000	1.0
OCDF	39001-02-0	60000	6000	1.0
PCB CONGENERS (or coplanars):				
3,3',4,4'-tetrachlorobiphenyl (IUPAC# 77)	32598-13-3	3.0	1.0	0.5
2,3,3',4,4'-pentachlorobiphenyl (# 105)	32598-14-4	0.3	0.1	0.5
2,3,4,4',5-pentachlorobiphenyl (# 114)	74472-37-0	0.3	0.1	0.5
2,3',4,4',5-pentachlorobiphenyl (#118)	31508-00-6	3.8	1.0	0.5
2',3,4,4',5-pentachlorobiphenyl (# 123)	65510-44-3	30	10	0.5
3,3,4,4',5pentachlorobiphenyl (# 126)	57465-28-8	0.03	0.01	0.5
2,3,3',4,4',5-hexachlorobiphenyl (# 156)	38380-08-4	3.0	1.0	1.0
2,3,3',4,4',5'-hexachlorobiphenyl (# 157)	69782-90-7	3.0	1.0	1.0
2,3',4,4',5,5'-hexachlorobiphenyl (# 167)	52663-72-6	3.0	1.0	1.0
3,3',4,4',5,5'-hexachlorobiphenyl (# 169)	32774-16-6	3.0	1.0	1.0
3,4,4',5-tetrachlorobiphenyl (# 81)	160901-68-8	6.0	2.0	0.5
2,3,3',4,4',5,5',-heptachlorobiphenyl (# 189)	39635-31-9	3.0	1.0	1.0
PCB HOMOLGUES:				
Total-PCBs	12767-79-2	500	200	5000

TABLE 6.1.1 CONTAMINANTS OF CONCERN AND OTHER TARGET ANALYTES –CONT.-

FOR FISH - Human Health Evaluation				
Analyte	CAS Number	Project Action	Project Quantitation	Achievable
		Limit	Limit	Lab. Limits
		ng/kg	ng/kg	QLs
		(wet weight)	(wet weight)	solid
				ng/kg
DIOXINS/FURANS:				
2,3,7,8-TCDD	1746-01-6	0.02	0.007	0.1
2,3,7,8-TCDF	51207-31-9	0.2	0.07	0.1
1,2,3,7,8-PeCDD	40321-76-4	0.02	0.007	0.5
1,2,3,7,8-PeCDF	57117-41-6	0.4	0.1	0.5
2,3,4,7,8-PeCDF	57117-31-4	0.04	0.01	0.5
1,2,3,4,7,8-HxCDD	39227-28-6	0.2	0.07	0.5
1,2,3,6,7,8-HxCDD	57653-85-7	0.2	0.07	0.5
1,2,3,7,8,9-HxCDD	19408-74-3	0.2	0.07	0.5
1,2,3,4,7,8-HxCDF	70648-26-9	0.2	0.07	0.5
1,2,3,6,7,8-HxCDF	57117-44-9	0.2	0.07	0.5
1,2,3,7,8,9-HxCDF	72918-21-9	0.2	0.07	0.5
2,3,4,6,7,8-HxCDF	60851-34-5	0.2	0.07	0.5
1,2,3,4,6,7,8-HpCDD	35822-46-9	2	0.7	0.5
1,2,3,4,6,7,8-HpCDF	67562-39-4	2	0.7	0.5
1,2,3,4,7,8,9-HpCDF	55673-89-7	2	0.7	0.5
OCDD	3268-87-9	200	20	1.0
OCDF	39001-02-0	200	20	1.0
PCB CONGENERS (or coplanars):				
3,3',4,4'-tetrachlorobiphenyl (IUPAC# 77)	32598-13-3	200	20	0.5
2,3,3',4,4'-pentachlorobiphenyl (# 105)	32598-14-4	200	20	0.5
2,3,4,4',5-pentachlorobiphenyl (# 114)	74472-37-0	42	4.2	0.5
2,3',4,4',5-pentachlorobiphenyl (#118)	31508-00-6	200	20	0.5
2',3,4,4',5-pentachlorobiphenyl (# 123)	65510-44-3	200	20	0.5
3,3,4,4',5pentachlorobiphenyl (# 126)	57465-28-8	0.2	0.07	0.5
2,3,3',4,4',5-hexachlorobiphenyl (# 156)	38380-08-4	42	4.2	1.0
2,3,3',4,4',5'-hexachlorobiphenyl (# 157)	69782-90-7	42	4.2	1.0
2,3',4,4',5,5'-hexachlorobiphenyl (# 167)	52663-72-6	2000	200	1.0
3,3',4,4',5,5'-hexachlorobiphenyl (# 169)	32774-16-6	2	0.7	1.0
3,4,4',5-tetrachlorobiphenyl (# 81)	160901-68-8	X	X	0.5
2,3,3',4,4',5,5',-heptachlorobiphenyl (# 189)	39635-31-9	200	20	1.0
PCB HOMOLGUES:				
Total-PCBs	12767-79-2	2000	700	5000

Table 6.1.1 identifies the contaminants of concern and other target analytes, along with the associated project action limits (PALs) and project quantitation limits (PQLs) set for fish and sediment samples collected from the Penobscot River. The PALs and PQLs identified are those deemed necessary to support both a human health evaluation and an ecological risk assessment. It should be noted that the human health-related values were developed to take into account cultural concerns of Tribal fisherman, and therefore reflect an approximately two times greater health risk than expected for non-Tribal recreational fishermen.

From the information presented on this table, it is obvious that the attainable laboratory quantitation limits (QLs) for a number of the analyses do not meet the specified PQLs. In fact, the analytical methods proposed, although state-of-the-art and performed by a reputable laboratory experienced with both the analysis and the specific sample media, do not even meet the PALs for a number of analytes. The PALs in question are those associated with the human health evaluation of fish tissue for many of the dioxins/furans, one PCB congener, and total PCB homologues, as well as the ecological assessment of fish tissue for three PCB congeners. However, the PALs for the majority of these analytes are well within the laboratory's detectable range, if present in samples at concentrations 2-3 times lower than the laboratory QLs. The only analytes that appear problematic for quantitation by the proposed analytical methods are three within the dioxin/furan group for the human health evaluation (including: 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, and 2,3,4,7,8--PeCDF) and one within the PCB congener group for the ecological assessment (including: 3,3,4,4',5-pentachlorobiphenyl). The PALs for these analytes are approximately 5-10 times lower than the laboratory QLs. While the detection of these analytes at concentration near or below the PALs may be challenging, the associated human health evaluation and ecological assessment will be performed in the most conservative manner to identify all potential risks.

6.1.2 FIELD AND QC SAMPLE SUMMARY

TABLE 6.1.2 FIELD AND QUALITY CONTROL SAMPLE SUMMARY TABLE

Medium/ Matrix[1,2,3]	Analytical Parameter	Concentration Level	Analytical Method/ SOP Reference	No. of Samples	No. of Field Duplicate Pairs	Organic		Inorganic		No. of VOA Trip Blanks	No. of Bottle Blanks	No. of Equipment Blanks	No. of PE Samples	Total No. Samples to Lab
						No. of MS	No. of MSD	No. of Duplicates	No. of Spikes					
Sediment	Grain Size			30	2					none	none	none	none	32
Sediment	TOC	See SOPs Appendix C		30	2		See SOPs Appendix C			none	none	none	none	32
Sediment	Dioxin/Furans			30	2					none	none	1	none	33
Sediment	Coplanar PCBs			30	2					none	none	1	none	33
Sediment	Total PCBs			30	2					none	none	1	none	33
Fish Tiss.	Dioxins/Furans			12	3					none	none	none	none	15
Fish Tiss.	Coplanar PCBs			12	3					none	none	none	none	15
Fish Tiss.	Total PCBs			12	3					none	none	none	none	15
Fish Tiss.	% Lipids			12	3					none	none	none	none	15

1. Field duplicate pairs for fish will consist of two composite samples taken at a site containing fish of equal length. Effort will be made at one river reach to produce paired composite samples of fish (of the same species)in which the fish sizes are as closely matched as possible. This will be done so that within the set of ten proposed samples, two subsets of two fish composite samples will be considered “field duplicate pairs.” One set will be small-mouth bass, the second set will be white sucker.

2. All individual fish samples will be comprised of composites of fish of similar lengths. The

samples will include 5 white sucker (each composites of 8-10 individuals) and 5 small mouth bass (each composites of 3-5 individuals).

3. Once at the laboratory, each of the 5 small mouth bass samples will be filleted and separated into two separate samples (fillet and offal), thereby these 5 samples will be considered by the lab as receipt of 10 samples.

6.1.3 ANALYTICAL SERVICES

TABLE 6.1.3 ANALYTICAL SERVICES

Medium/ Matrix	Analytical Parameter	Concentration Level	Analytical Method/ SOP	Data Package Turnaround Time	Laboratory/ Organization (Name and Address: Contact Person & Telephone Number)	Backup Laboratory/ Organization (Name and Address: Contact Person & Telephone Number)
Sediment	Dioxins/Furans				For all parameters at left:	
Sediment	Coplanar PCBs		All SOPs attached in		Therese Anderson	None.
Sediment	Total PCBs		Appendix C			
Sediment	TOC				Water Research Institute	
Sediment	Grain Size			30 days	Sawyer Env. Research Center	
Sediment	% moisture			after receipt	University of Maine	
				at lab	Orono, Maine 04469-5764	
Fish Tiss.	Dioxins/Furans					
Fish Tiss.	Coplanar PCBs		All SOPs attached in		Tele.: (207)581-3287	
Fish Tiss.	Total PCBs		Appendix C		Fax: (207)581-3290	
Fish Tiss.	% Lipids				email: therese@maine.maine.edu	

Analysis of samples collected in the fall of 1999 will not begin upon receipt. To ensure the integrity of the samples, all sediment and fish samples will be frozen during the interim. All small mouth bass samples will be filleted and separated into fillet and offal upon receipt at the laboratory and prior to freezing. Suckers will be frozen whole.

6.2 PROJECT SCHEDULE

OBJECTIVE: Historical data review and data base development

September 1, 1999 – May 1, 2000

The USGS will establish a relational study database for confidentiality. The database will be populated with data obtained via this study. At the end of the project, the database will be transferred to PIN DNR accompanied by documentation. If desired by the Maine DEP, the database without the data obtained from this study can be transferred to MDEP for their ongoing dioxin project and their cooperating laboratory, WRI.

Collection, review, and analysis of historical data regarding the sedimentary structure of the riverbed, and existing dioxin, furan, and PCB data in the study area will be done by USEPA and USGS personnel.

OBJECTIVE: Map production of occurrence and distribution of fine-grained sediments in the Penobscot River study area

September 1, 1999 - July 1, 2000

USGS has performed a riverbed sediment survey in the spring and early summer of 1999 at select areas between the boat launch near Hersey Island in Lincoln and the dam in Old Town in addition to a reference site at the Mattaseunk Dam. The geophysical data obtained from this work will be assembled into a digital map and data report describing the distribution and locations of observed riverbed sediment types.

OBJECTIVE: Fish tissue and sediment sampling for dioxin, furan, PCB, grain size and TOC analyses

September 16, 1999 – November 30, 1999

USGS will perform sampling of fish tissues and surficial sediments in the river channel. Samples will be analyzed for dioxin, furans, and PCBs. Sediment samples will also be analyzed for grain size and TOC. Fish samples will also have lipids determined. USGS will produce a data report compiling all data obtained, describing their distribution and occurrence in the study area.

OBJECTIVE: Lab analyses of fish tissue and sediment for dioxin, furan, PCB, grain size and TOC

July 10, 2000 – December 29, 2000

Samples will be analyzed for dioxin, furans, and PCBs. Sediment samples will also be analyzed for grain size and TOC. Data will be provisionally provided to cooperators and data validators as soon as they are available from the lab. Data will be validated within 35 days of receipt (deadline February 5, 2000).

OBJECTIVE: Dioxin, furans, PCBs data report

February 5, 2001 – March 5, 2001

USGS will produce a data report compiling all data obtained, describing their distribution and occurrence in the study area within 30 days of validation.

7.0 PROJECT QUALITY OBJECTIVES AND MEASUREMENT PERFORMANCE CRITERIA

7.1 PROJECT QUALITY OBJECTIVES

The project quality objectives are summarized in Section 5.2.1. Samples to be collected and data to be generated to support these objectives are provided throughout Sections 6.0 and 8.0. Measurement Performance Criteria established for the data to be generated is provided in Section 7.2.

7.2 MEASUREMENT PERFORMANCE CRITERIA

Measurement Performance Criteria (MPC) have been set for each analytical method and for each sample media to ensure that the quality of the samples collected and data generated are sufficient to meet the project quality objectives (PQOs) defined in Section 5.2.1. These are comprised of project-specific MPC and generic analytical MPC. The project-specific MPC focus primarily on the following data quality indicators (DQIs): accuracy, precision, and sensitivity. Generic MPC for the remaining DQIs were defaulted to the values set by the stringent protocols included within the analytical standard operating procedures (SOPs). Prior to defaulting to these values, the laboratory's analytical SOPs were thoroughly reviewed to ensure that QC samples were included and criteria were set for each of the DQIs. A summary of the MPC for each DQI is summarized in Table 13.2.1, as the "acceptance criteria". This table also identifies the QC samples used to assess the acceptance criteria, the frequency at which each QC sample must be analyzed, and corrective actions associated with exceeding the acceptance criteria.

The project-specific MPC for accuracy and precision are also designated within Table 13.2.1. The ability to assess accuracy was ensured by requiring that, at a minimum, each analytical procedure include the analysis of a second source standard reference material (SRM) for each sample media, when available. (SRMs were available for all analyses except for total organic carbon.) Assessment of overall precision (including both field and laboratory components) was ensured by requiring the collection and analysis of designated field duplicates and setting associated project-specific acceptance criteria. Achieving the necessary sensitivity criteria was ensured by selecting analytical methods capable of meeting the quantitation limits required to achieve the PALs and PQLs, as discussed in Section 6.1.1.

8.0 SAMPLING PROCESS DESIGN

8.1 SAMPLING DESIGN AND RATIONALE

Sediment Sampling

Sediment and fish tissue samples will be located throughout designated areas within the study area. A description of the sampling design and rationale for each of these media are described below.

Sediment samples will include approximately 2-5 sediment samples from nine reaches in the study area, for a total of 30 samples (excluding QC samples). These samples will be analyzed for grain size, TOC, dioxins/furans, PCBs (coplanar and total). Two QC field duplicates will be collected at two different locations and one field equipment (rinsate) blank will be collect to bring the total number of samples to 33.

The purpose of the sediment sampling and analysis is to generate data that will support three data quality objectives (human health effects evaluation, ecological risk assessment, and the determination of the occurrence and distribution of contamination). Wherever possible, samples will be selected from locations that will support all three data quality objectives. However, if not possible, at least one sediment sample will be collected to meet each objective from each of the nine reaches. For the human health effects evaluation, samples should be selected in areas where people are likely to be exposed. While for the ecological risk assessment, sample locations should be targeted in depositional areas. To support the determination of the occurrence and distribution of contamination, samples should be collected from all areas surveyed by use of geophysical techniques.

The number and locations of samples is described in sections 8.1.1 and 8.1.2. Sediment sample locations will be chosen based upon the following criteria (not in order of priority):

1. Depositional zones of fine-grained material (both sand/silt and materials rich in organic content) observed within the river channel via geophysical techniques

2. Coincidence with Maine Department of Environmental Protection fish sampling reaches for the ongoing State of Maine dioxin monitoring program (see section

5.2).

3. Known or suspected littoral wading-contact areas along the mainland and island shorelines (associated with swimming, fishing, fiddlehead harvesting, boat launching, etc.).

4. Coincidence with the water quality (conductivity) study performed by the Penobscot Indian Nation (PIN) from Lincoln to just below West Enfield indicating a higher conductivity plume hugging the eastern shore downstream of Lincoln.

5. Upstream and downstream of river-features that control or potentially impact sediment transport (dam structures and impoundments).

Fish Tissue Sampling

Fish tissue samples will include whole-bodied fish composites from 2 reaches in the study area. Each of the reaches will be represented by 2 fish species. 4 composite samples (2 sucker and 2 bass) will be collected at West Enfield and 4 composite samples (2 sucker and 2 bass) will be collected at Old Town. The bass samples will be further split into fillet and offal samples for a total of 12 fish tissue samples for analysis of dioxins/furans and PCBs (coplanar and total). In addition, two duplicate QC samples (one for each species) will be taken in the field at one site. The bass duplicate will also be split into fillet and offal resulting in 3 QC samples. QC samples plus the original samples yield a total of 15 samples.

The purpose of the fish sampling and analysis is to generate data that will support the three data quality objectives listed above for sediment sampling. Therefore, samples will be selected from locations that will support all three data quality objectives. From each location, fish species to be sampled will include both small mouth bass and white sucker, in order to generate data representative of various steps in the ecological food chain. In addition, the small mouth bass samples will be divided for separate analysis of the fillet and offal to supply additional information to support the human health evaluation and the ecological risk assessment.. The river reaches for fish sampling will be chosen based on the following criteria (not necessarily in order of importance):

1. Because dioxin and coplanar PCB data collected by the Maine Department of Environmental Protection for the ongoing State of Maine dioxin and coplanar PCB sampling program (see section 5.2) may be useable by risk assessors, river stretches that exclude the DEP sampling reaches will be chosen. This will be done in an effort to complement the State DEP data. The river reaches sampled for fish by the State of Maine that are within the study area of the current project

include: Costigan/Milford, Mahockanock/S. Lincoln, and Mattaseunk. Data generated from sampling and analysis of these river reaches from 1997 through 1999 will be used to supplement the data generated from the current project. These DEP data will include dioxin and co-planar PCBs from the analysis of small mouth bass fillets (single fish, 15-19 inches in length) and whole bodied white suckers (single fish, 12-19 inches in length). In addition, the 1999 samples, currently being collected by the State of Maine, will be made available for further analysis as part of the current project. These analyses may include total PCBs on bass fillets and whole bodied suckers, as well as analysis of all analytical parameters identified in Table 6.1.2 on bass offal."

2. Upstream and downstream of river-features that control or potentially impact fish passage or habitat (dam structures, impoundments, fish ladders, falls).

8.1.1 SAMPLE LOCATIONS, SAMPLING AND ANALYSIS METHODS/SOP REQUIREMENTS

TABLE 8.1.1 SAMPLE LOCATIONS, SAMPLING AND ANALYSIS METHODS/SOP REQUIREMENTS

Location ID	Medium/ Matrix	Depth (units)	Analytical Parameter	Conc. Level	Number of Samples (Identify field dups and replicates)	Sampling SOP	Analytical Method/ SOP	Sample Volume	Containers (no. size & type	Preservation Req. (chem, temp, light)	Maximum Holding Time[1] (prep/analysis)
Old Town	Sediment	Top 6"	TOC		5	Section 9.0	Appendix C	500ml	1 1L clear glass	cool 4deg C	1 yr
			Grain size	see SOPs	5				wide-mouth jar		
			Dioxin/furan	Appendix C	5	Section 9.0	Appendix C	500ml	1 500ml amber	cool 4deg C	1 yr
			Coplanar PCB		5				glass w-mouth		
			Total PCB		5						
Costigan	Sediment	Top 6"	TOC		2	Section 9.0	Appendix C	500ml	1 1L clear glass	cool 4deg C	1 yr
			Grain size	see SOPs	2				wide-mouth jar		
			Dioxin/furan	Appendix C	2	Section 9.0	Appendix C	500ml	1 500ml amber	cool 4deg C	1 yr
			Coplanar PCB		2				glass w-mouth		
			Total PCB		2						
Greenbush	Sediment	Top 6"	TOC		5	Section 9.0	Appendix C	500ml	1 1L clear glass	cool 4deg C	1 yr
			Grain size	see SOPs	5				wide-mouth jar		
			Dioxin/furan	Appendix C	5	Section 9.0	Appendix C	500ml	1 500ml amber	cool 4deg C	1 yr
			Coplanar PCB		5				glass w-mouth		
			Total PCB		5						

Sample conatiners will be certified clean according to "Spec. and Guid. For Contaminat-free sample containers, EPA540/R-93/051, PB93-963316, December 1992

1 All samples will be delivered to the laboratory within 48 hours of collection, where they will be frozen until sample preparation/analysis. The holding time from sample collection to analysis will not exceed one year

Table 8.1.1 Sample Locations, sampling and analysis methods/SOP requirements –cont-

Location ID	Medium/ Matrix	Depth (units)	Analytical Parameter	Conc. Level	Number of Samples (Identify field dups and replicates)	Sampling SOP	Analytical Method/ SOP	Sample Volume	Containers (no. size & type	Preservation Req. (chem, temp, light)	Maximum Holding Time[1] (prep/analysis)
Passadumkeag	Sediment	Top 6"	TOC		3	Section 9.0	Appendix C	500ml	1 1L clear glass	cool 4deg C	1 yr
			Grain size	see SOPs	3				wide-mouth jar		
			Dioxin/furan	Appendix C	3	Section 9.0	Appendix C	500ml	1 500ml amber	cool 4deg C	1 yr
			Coplanar PCB		3				glass w-mouth		
			Total PCB		3						
West Enfield	Sediment	Top 6"	TOC		4	Section 9.0	Appendix C	500ml	1 1L clear glass	cool 4deg C	1 yr
			Grain size	see SOPs	4				wide-mouth jar		
			Dioxin/furan	Appendix C	4	Section 9.0	Appendix C	500ml	1 500ml amber	cool 4deg C	1 yr
			Coplanar PCB		4				glass w-mouth		
			Total PCB		4						
Mahockanock	Sediment	Top 6"	TOC		3 + 1Field Dup	Section 9.0	Appendix C	500ml	1 1L clear glass	cool 4deg C	1 yr
			Grain size	see SOPs	3 + 1Field Dup				wide-mouth jar		
			Dioxin/furan	Appendix C	3 + 1Field Dup	Section 9.0	Appendix C	500ml	1 500ml amber	cool 4deg C	1 yr
			Coplanar PCB		3 + 1Field Dup				glass w-mouth		
			Total PCB		3 + 1Field Dup						

Sample Containers will be certified clean according to "Specifications and Guidance for Contaminant-Free Sample Containers, EPA540/R-93/051, PB93-963316, Dec1992

1 All samples will be delivered to the laboratory within 48 hours of collection, where they will be frozen until sample preparation/analysis. The holding time from sample collection to analysis will not exceed one year

Table 8.1.1 Sample Locations, sampling and analysis methods/SOP requirements –cont-

Location ID	Medium/ Matrix	Depth (units)	Analytical Parameter	Conc. Level	Number of Samples (Identify field dups and replicates)	Sampling SOP	Analytical Method/ SOP	Sample Volume	Containers (no. size & type	Preservation Req. (chem, temp, light)	Maximum Holding Time[1] (prep/analysis)
Lincoln	Sediment	Top 6"	TOC		3 + 1Field Dup	Section 9.0	Appendix C	500ml	1 1L clear glass	cool 4deg C	1 yr
			Grain size	see SOPs	3+ 1Field Dup				wide-mouth jar		
			Dioxin/furan	Appendix C	3 + 1Field Dup	Section 9.0	Appendix C	500ml	1 500ml amber	cool 4deg C	1 yr
			Coplanar PCB		3+ 1Field Dup				glass w-mouth		
			Total PCB		3 + 1Field Dup						
Mattaseunk	Sediment	Top 6"	TOC		4	Section 9.0	Appendix C	500ml	1 1L clear glass	cool 4deg C	1 yr
			Grain size	see SOPs	4				wide-mouth jar		
			Dioxin/furan	Appendix C	4	Section 9.0	Appendix C	500ml	1 500ml amber	cool 4deg C	1 yr
			Coplanar PCB		4				glass w-mouth		
			Total PCB		4						
Grindstone	Sediment	Top 6"	TOC		1	Section 9.0	Appendix C	500ml	1 1L clear glass	cool 4deg C	1 yr
			Grain size	see SOPs	1				wide-mouth jar		
			Dioxin/furan	Appendix C	1	Section 9.0	Appendix C	500ml	1 500ml amber	cool 4deg C	1 yr
			Coplanar PCB		1				glass w-mouth		
			Total PCB		1						

Secifications and Guidance for contaminant free sample containers, EPA540/R-93/051, PB93-963316, Dec 1992

1 All samples will be delivered to the laboratory within 48 hours of collection, where they will be frozen until sample preparation/analysis. The holding time from sample collection to analysis will not exceed one year

Table 8.1.1 Sample Locations, sampling and analysis methods/SOP requirements –cont-

Location ID	Medium/ Matrix	Depth (units)	Analytical Parameter	Conc. Level	Number of Samples (Identify field dups and replicates)	Sampling SOP	Analytical Method/ SOP	Sample Volume	Containers (no. size & type	Preservation Req. (chem, temp, light)	Maximum Holding Time[1] (prep/analysis)
Equip.	Water *	not applicable	TOC		0						
Blank			Grain size	see SOPs	0						
			Dioxin/furan	Appendix C	1	Section 9.0	Appendix D	1 L	1 L amber	cool 4deg C	1 yr
			Coplanar PCB		1			water*	glass w-mouth		
			Total PCB		1				teflon lid		

Secifications and Guidance for contaminant free sample containers, EPA540/R-93/051, PB93-963316, Dec 1992

* The equipment blank will consist of analytical-grade water procured from the WRI/Univ. Of Maine laboratory and deemed appropriate by the laboratory for the analysis of the analytical parameters and quantitation limits to be measured.

1 All samples will be delivered to the laboratory within 48 hours of collection, where they will be frozen until sample preparation/analysis. The holding time from sample collection to analysis will not exceed one year

Table 8.1.1 Sample Locations, sampling and analysis methods/SOP requirements –cont-

Location ID	Medium/ Matrix	Depth (units)	Analytical Parameter	Conc. Level	Number of Samples (Identify field dups and replicates)	Sampling SOP	Analytical Method/ SOP	Sample Volume	Containers (no. size & type	Preservation Req. (chem, temp, light)	Maximum Holding Time[1] (prep/analysis)
Old Town	whole body	n/a	Dioxin/furan		2	Section 9.0	Appendix C	16-20	Aluminum foil	cool 4deg C	1 yr
	suckers		Coplanar PCB	see SOPs	2			indiv.	and ziploc bags		
			Total PCB	Appendix C	2						
			Lipids		2						
	bass fillet	n/a	Dioxin/furan		2	Section 9.0	Appendix C	6-10	Aluminum foil	cool 4deg C	1 yr
			Coplanar PCB	see SOPs	2			indiv.	and ziploc bags		
			Total PCB	Appendix C	2						
			Lipids		2						
	bass offal	n/a	Dioxin/furan		2	Section 9.0	Appendix C	6-10	Aluminum foil	cool 4deg C	1 yr
			Coplanar PCB	see SOPs	2			indiv.	and ziploc bags		
			Total PCB	Appendix C	2						
			Lipids		2						

All fish samples comprised of composites of fish of similar length. Sucker composites consist of 8-10 indiv. Bass composites consist of 3-5 indiv.

1 All samples will be delivered to the laboratory within 48 hours of collection. Sucker samples will be frozen immediately; bass samples will be filleted immediately and divided into two separate samples (fillet and offal) and then frozen. Following receipt (and freezing) of all samples, the lab will process the samples as follows: partially thaw, grind and composite with 24 hours
are/analyze immediately. The holding time from sample collection until analysis will not exceed one year

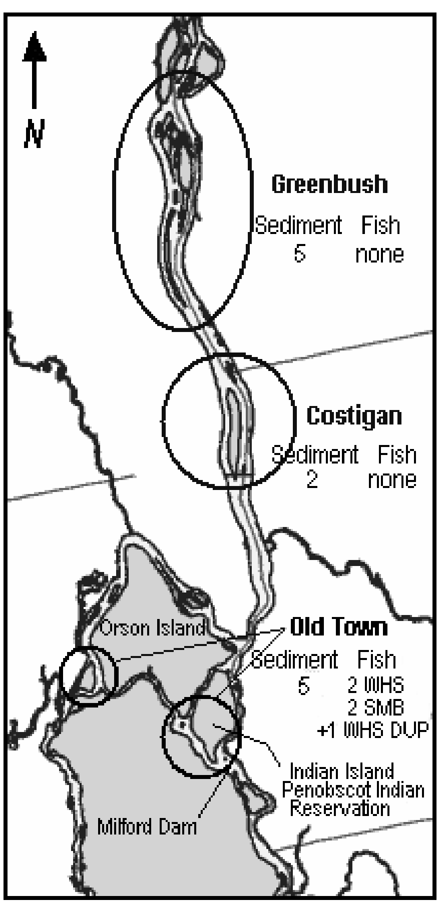
Table 8.1.1 Sample Locations, sampling and analysis methods/SOP requirements -cont-

Location ID	Medium/ Matrix	Depth (units)	Analytical Parameter	Conc. Level	Number of Samples (Identify field dups and replicates)	Sampling SOP	Analytical Method/ SOP	Sample Volume	Containers (no. size & type	Preservation Req. (chem, temp, light)	Maximum Holding Time[1] (prep/analysis)
West Enfield	whole body	n/a	Dioxin/furan		2	Section 9.0	Appendix C	16-20	Aluminum foil	cool 4deg C	1 yr
	suckers		Coplanar PCB	see SOPs	2			indiv.	and ziploc bags		
			Total PCB	Appendix C	2						
			Lipids		2						
	bass fillet	n/a	Dioxin/furan		2	Section 9.0	Appendix C	6-10	Aluminum foil	cool 4deg C	1 yr
			Coplanar PCB	see SOPs	2			indiv.	and ziploc bags		
			Total PCB	Appendix C	2						
			Lipids		2						
	bass offal	n/a	Dioxin/furan		2	Section 9.0	Appendix C	6-10	Aluminum foil	cool 4deg C	1 yr
			Coplanar PCB	see SOPs	2			indiv.	and ziploc bags		
			Total PCB	Appendix C	2						
			Lipids		2						

All fish samples comprised of composites of fish of similar length. Sucker composites consist of 8-10 indiv. Bass composites consist of 3-5 indiv.

1 All samples will be delivered to the laboratory within 48 hours of collection. Sucker samples will be frozen immediately; bass samples will be filleted immediately and divided into two separate samples (fillet and offal) and then frozen. Following receipt (and freezing) of all samples, the lab will process the samples as follows: partially thaw, grind and composite with 24 hours are/analyze immediately. The holding time from sample collection until analysis will not exceed one year

8.1.2 Sample locations map – (Ref. Map 5.2.2.)



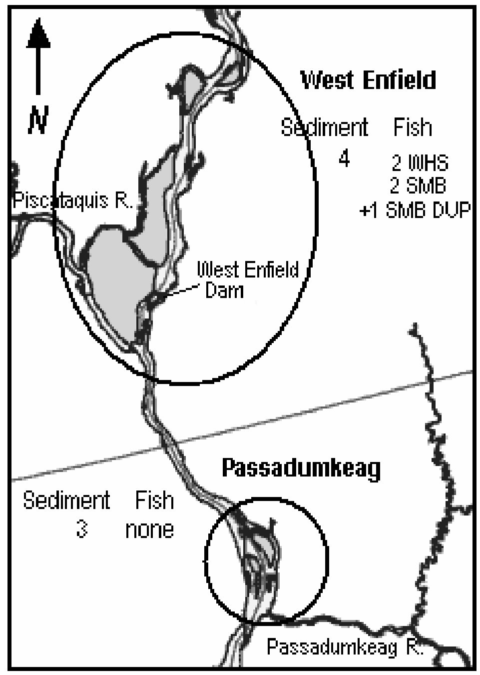
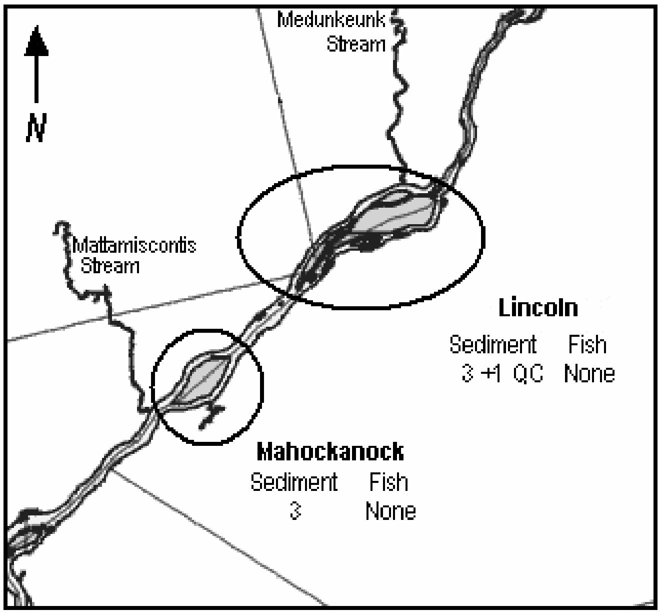


FIGURE 8.1.2A (LEFT) AND 8.1.2B (RIGHT) LOCATIONS OF OLD TOWN, COSTIGAN, GREENBUSH, PASSADUMKEAG, AND WEST ENFIELD SAMPLING AREAS.



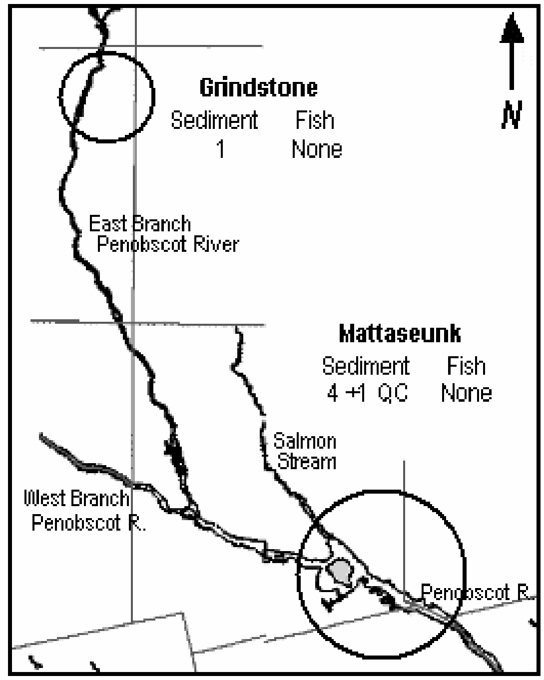


FIGURE 8.1.2C (LEFT) AND 8.1.2D (RIGHT) LOCATIONS OF THE MAHOCKANOCK, LINCOLN, MATTASEUNK, AND GRINDSTONE SAMPLE AREAS

8.2 SEDIMENT SAMPLING

Surficial sediment samples will be collected from nine river reaches. The sampling locations, tentatively identified based on the criteria included in Section 8.1, are depicted in Figures 8.1.2A, 8.1.2B, and 8.1.2C. A summary of the proposed sampling locations, associated sampling and analytical methods, and sample collection requirements is included in Table 8.1.1.

Sediment samples will be collected at depths of approximately 0-6 inches below the sediment surface. For the human health effects evaluation, some "shallow" samples will be collected in water <1 foot in depth. (It is important to note that if the current shoreline is significantly different than the historical shoreline, samples will be collected no more than 6 feet from the mean historical shoreline.) For the ecological risk assessment, the shallow sediment samples will be collected in low flow, depositional areas covered by at least 6 inches of water. Contingencies are in place to collect some of the samples from “suspect” areas identified while in the field. These suspect areas may include: wastewater outfalls, locations of unusual olfactory or visible features, and/or areas coincident with changes in the river’s water quality parameters. Whenever possible, samples from each reach will include fine-grained sand/silt, as well as those materials rich in organic content, in order to determine whether there is a correlation between grain size and/or TOC and any associated contaminant concentrations present.

8.3 FISH SAMPLING

Fish tissue samples, comprised of both small mouth bass and white sucker samples, will be collected from two river reaches. The sampling locations, tentatively identified based on the criteria included in Section 8.1, are depicted in Figures 8.1.2A and 8.1.2B. A summary of the proposed sampling locations, associated sampling and analytical methods, and sample collection requirements is included in Table 8.1.1.

Small mouth bass samples will be comprised of fish measuring 15-19 inches in length. If obtaining bass of this size proves problematic due to environmental conditions and population, bass samples may consist of fish as small as 12 inches (lowest limit). A total of 3-5 fish will comprise a composite small-mouth bass sample. The samples will be filleted at the laboratory, and the fillet and offal from those samples collected at each reach will be composited into two distinct samples, for analysis of a total of 5 fillet and five offal composites.

White sucker samples will be comprised of fish measuring 12-19 inches in length. An effort to sample a range of sizes will be made. A total of 8-10 fish will comprise a composite white sucker sample. A total of 5 whole body composites will be analyzed at the lab.

All fish samples will be delivered to the lab within 48 hours of collection. The lab will freeze the sucker samples immediately. The bass samples will be filleted immediately and divided into two separate samples (fillet and offal) and then frozen. Following receipt (and freezing) of the samples, the lab will process the samples as follows: partially thaw, grind and composite within 24 hours of partially thawing, refreeze immediately until ready to analyze, and then thaw and prepare/analyze immediately. The holding time from sample collection to analysis should not exceed 1 year (see Appendix C).

9.0 SAMPLING PROCEDURES AND REQUIREMENTS

9.1 SAMPLING STANDARD OPERATING PROCEDURES

SOP-SEDIMENT COLLECTION (MODIFIED FROM STATE DEP STANDARD OPERATING PROCEDURES)

1.0 Equipment & Supplies
- 1.1 Sediment sampler
  - 1.1.1 Ponar sediment sampler used in areas of thin (less than 6 inches thick) fine-grained sediment. (The Ponar sampler is designed to minimize winnowing of sediment during collection).
- 1.2 500 ml amber glass precleaned container with teflon cap (for dioxin & PCBs)
- 1.3 1 liter clear glass precleaned container with teflon cap (for TOC & grain size)
- 1.4 1 liter ml amber glass precleaned container with teflon cap (for dioxin & PCBs equipment blank)
- 1.5 Stainless steel spoon
- 1.6 Stainless steel pan
- 1.7 Stainless steel bowl
- 1.8 Stainless steel ruler
- 1.9 Bucket
- 1.10 Brush
- 1.11 Methanol
- 1.12 Cooler
- 1.13 Ice
- 1.14 Ziploc bags to contain ice
- 1.15 Analytically pure water for equipment blank

2.0 Pre-cleaning and decontamination
- 2.1 Sediment sampler
  - 2.1.1 Pre-cleaning
    - 2.1.1.1 Scrub with tap water and LiquiNox using soft brush
    - 2.1.1.2 Rinse with tap water
    - 2.1.1.3 Rinse with methanol
    - 2.1.1.4 Air dry
  - 2.1.2 Decontamination between grab samples at same location
    - 2.1.2.1 Rinse with lake/river water
    - 2.1.2.2 Collect next sample
  - 2.1.3 Decontamination before grab samples at new location
    - 2.1.3.1 Scrub with tap water and LiquiNox using soft brush

- 2.1.3.2 Rinse with tap water
- 2.1.3.3 Rinse with methanol
- 2.1.3.4 Air dry
- 2.1.3.5 Collect sample

2.2 Glass container with teflon cap
- 2.2.1 Use containers and lids certified pre-cleaned for organics (source: Fisher Scientific)

2.3 Stainless steel spatula, bowl, and pan
- 2.3.1 Pre-cleaning
  - 2.3.1.1 Scrub with tap water and LiquiNox using soft brush
  - 2.3.1.2 Rinse with tap water
  - 2.3.1.3 Rinse with methanol
  - 2.3.1.4 Air dry
- 2.3.2 Decontamination between grab samples at same location
  - 2.3.2.1 Rinse with lake/river water
- 2.3.3 Decontamination before grab samples at new location
  - 2.3.3.1 Scrub with tap water and LiquiNox using soft brush
  - 2.3.3.2 Rinse with tap water
  - 2.3.3.3 Rinse with methanol
  - 2.3.3.4 Air dry

3.0 Sample collection

3.1 Anchor boat at the sampling location. If multiple samples are to be taken in the immediate vicinity, begin at the most downstream location and sample in the upstream direction.

3.2 Secure sediment sampler to boat (tie off line)

3.3 Ponar sampler
- 3.3.1 Lower sediment sampler until it reaches bottom and triggers
- 3.3.2 Raise sample and place in large pan
- 3.3.3 Allow water to infiltrate/percolate through sediment and drain off sediment before collecting sample. The intention is to collect a minimum of 30% solids for each sample. Details of any procedures taken to minimize water content of the samples will be recorded in the field notes.
- 3.3.4 Open sampler from top
- 3.3.5 Using spatula and ruler collect upper six inches of sediment and place in stainless steel bowl
- 3.3.6 Place remaining sediment in bucket until sample collection is complete
- 3.3.7 Rinse sampler, spatula, and pan in lake/river water
- 3.3.8 Repeat until adequate sediment volume is obtained (NOTE: use both sides of boat to avoid sampling in previously disturbed area)
- 3.3.9 Thoroughly mix sediment in bowl using spatula
- 3.3.10 Fill container, tighten lid
- 3.3.11 Place container in cooler on ice

3.3.12 Rinse equipment in lake/river water
3.3.13 Dump unused sediment overboard
3.3.14 Pre-clean all equipment
3.3.15 Record water depth, number of grabs collected, sediment thickness collected, and sediment appearance
3.3.16 At end of the day, either deliver samples to Water Research Institute Laboratory if the laboratory is still open (before 5pm) or deliver the following morning at 7am. If samples are kept overnight, they will be stored in coolers with additional ice at 4 degrees C or cooler until delivery.
3.3.17 Upon delivery to WRI Laboratory, chain of custody forms will be signed and the laboratory will immediately freeze all received samples until analysis.

4.0 Equipment blank collection

4.1 Following decontamination of the sediment sampler and related sampling equipment, as presented in subsections 2.1.3 and 2.3.3, respectively, collect an equipment blank of all equipment used in the sediment sampling procedure.

4.1.1 Pour the required amount of analytical grade water through the ponar sampler, into the pan, and then over the spoon and into the stainless steel bowl. The amount of water should be, at minimum, equivalent to the volume required for all the analyses to be performed.
4.1.2 Pour the water from the bowl into the appropriate sample containers
4.1.3 Place the sample in a cooler with ice to maintain the temperature at 4 degrees C.
4.1.4 At end of the day, either deliver samples to Water Research Institute Laboratory if the laboratory is still open (before 5pm) or deliver the following morning at 7am. If samples are kept overnight, they will be stored in coolers with additional ice at 4 degrees C or cooler until delivery.
4.1.5 Upon delivery to WRI Laboratory, chain of custody forms will be signed and the laboratory will immediately freeze all received samples until analysis.

SOP-FISH COLLECTION PROTOCOLS (MODIFIED FROM STATE DEP STANDARD OPERATING PROCEDURES)

1.0 Equipment & Supplies

1.1 Gill net and tackle (supplied by the PIN)
1.2 Cooler
1.3 Ice
1.4 Stainless steel bowl
1.5 Measuring board
1.6 Scales
1.7 Knife
1.8 Scale envelopes/ bags
1.9 Aluminum foil
1.10 Plastic garbage bags
1.11 Ziploc bags

2.0 Pre-cleaning and decontamination

- 2.1 The bowl, measuring board, scales, and knife will be washed in LiquiNox and water using a soft brush and rinsed in river water before each fish processing session.

3.0 Fish collection

- 3.1 Gill nets will be set and fished until the desired number of fish are collected. Other sampling gear, including rod and reel (tackle), may be used as appropriate.
- 3.2 Upon capture, the length of the fish will be determined to meet the size requirements of the study. If so, the fish will be placed live in a cooler until the desired number of fish are collected. If not, the fish will be returned to the river.
- 3.3 Different species of fish will be kept in separate coolers.
- 3.4 The fish will be maintained in the coolers for no more than 4 hours before processing the fish.

4.0 Fish processing

- 4.1 Fish will be processed on shore.
- 4.2 Each fish will be killed by breaking the spinal cord at the base of the skull with thumb and forefinger.
- 4.3 Lengths and weights will be measured and recorded on field forms. Lengths will be measured in millimeters from the tip of the snout to the tip of the depressed caudal fin. Weights will be measured in grams.
- 4.4 Scales will be taken for determining age of fish.
- 4.5 Each fish will be examined externally for anomalies.
- 4.6 Whole fish will be wrapped in aluminum foil (shiny side out), labeled individually, placed in a ziploc bag, and placed on ice.
- 4.7 Each composite sample consisting of 3 fish of similar size (within 10% length of each other) will be bagged in a large ziploc together with a composite sample ID label.
- 4.8 At end of the day, either deliver samples to Water Research Institute Laboratory if the laboratory is still open (before 5pm) or deliver the following morning at 7am. If samples are kept overnight, they will be stored in coolers with additional ice at 4 degrees C or cooler until delivery.
- 4.9 Upon delivery to WRI Laboratory, chain of custody forms will be signed and the laboratory will immediately freeze all received samples until analysis.

9.2 SAMPLING SOP MODIFICATIONS

All field personnel have authority to initiate modifications to the SOP. The initiating field persons will provide the proposed modifications to the Sampling Coordinator who will submit the proposed modifications to appropriate lead Organization QA/QC reviewers for approval.

9.3 CLEANING AND DECONTAMINATION OF EQUIPMENT/SAMPLE CONTAINERS

2.0 Pre-cleaning and decontamination
- 2.1 Sediment sampler
  - 2.1.1 Pre-cleaning
    - 2.1.1.1 Scrub with tap water and LiquiNox using soft brush
    - 2.1.1.2 Rinse with tap water
    - 2.1.1.3 Rinse with methanol
    - 2.1.1.4 Air dry
  - 2.1.2 Decontamination between grab samples at same location
    - 2.1.2.1 Rinse with lake/river water
    - 2.1.2.2 Collect next sample
  - 2.1.3 Decontamination before grab samples at new location
    - 2.1.3.1 Scrub with tap water and LiquiNox using soft brush
    - 2.1.3.2 Rinse with tap water
    - 2.1.3.3 Rinse with methanol
    - 2.1.3.4 Air dry
    - 2.1.3.5 Collect sample
- 2.2 Glass container with Teflon cap
  - 2.2.1 Use containers and lids certified pre-cleaned for organics (source: Fisher Scientific)
- 2.3 Stainless steel spatula, bowl, and pan
  - 2.3.1 Pre-cleaning
    - 2.3.1.1 Scrub with tap water and LiquiNox using soft brush
    - 2.3.1.2 Rinse with tap water
    - 2.3.1.3 Rinse with methanol
    - 2.3.1.4 Air dry
  - 2.3.2 Decontamination between grab samples at same location
    - 2.3.2.1 Rinse with lake/river water
  - 2.3.3 Decontamination before grab samples at new location
    - 2.3.3.1 Scrub with tap water and LiquiNox using soft brush
    - 2.3.3.2 Rinse with tap water
    - 2.3.3.3 Rinse with methanol
    - 2.3.3.4 Air dry
- 2.4 The bowl, measuring board, scales, and knife will be washed in LiquiNox and water using a soft brush and rinsed in river water before each fish processing session.

9.4 FIELD EQUIPMENT CALIBRATION

None required. No water quality parameters will be collected.

9.5 FIELD EQUIPMENT MAINTENANCE, TESTING AND INSPECTION REQUIREMENTS

Sample containers are purchased clean from I-CHEM according to Specifications and Guidance for contaminant free sample containers, EPA540/R-93/051, PB93-963316, Dec 1992. See also section 9.6.

All sampling equipment will be maintained, tested, and inspected regularly according to policies set forth by this office in its quality assurance plan regarding field work for water-quality activities. See this document, "QUALITY ASSURANCE PLAN FOR WATER-QUALITY ACTIVITIES OF THE MAINE DISTRICT" attached as Appendix E. See also section 9.6.

9.6 INSPECTION AND ACCEPTANCE REQUIREMENTS FOR SUPPLIES/ SAMPLE CONTAINERS

Sample containers are purchased clean from I-CHEM according to Specifications and Guidance for contaminant free sample containers, EPA540/R-93/051, PB93-963316, Dec 1992. Sample containers are inspected for breakage and discarded if found to be broken. Lots of purchased containers from I-CHEM are certified clean by an accompanying Certificate of Analysis prepared in accordance with I-CHEM performance based specifications. The containers are guaranteed by I-CHEM to meet or exceed analyte specifications established in the US EPA Specifications and Guidance for contaminant free sample containers, EPA540/R-93/051, PB93-963316, for use in Superfund and other hazardous waste programs. Due to the documented cleaning process performed by I-CHEM, the containers are not tested by the Maine District Office for cleanliness.

All sampling equipment will be maintained, tested, and inspected regularly according to policies set forth by this office in its quality assurance plan regarding field work for water-quality activities. See this document, "QUALITY ASSURANCE PLAN FOR WATER-QUALITY ACTIVITIES OF THE MAINE DISTRICT" attached as Appendix D.

10.0 SAMPLE HANDLING, TRACKING, AND CUSTODY REQUIREMENTS

10.1 SAMPLE COLLECTION DOCUMENTATION

All activities will be documented according to procedures described in sections 9.0 and 15.0 and according to field and laboratory data sheets. Variances from these procedures will be documented and reported following the communication pathways noted in section 4.1.1. Adequate documentation will be provided to ensure that the data obtained by sampling and analyses are useable, justifiable, and in agreement with the field and analytical requirements of the project. Each sample will be documented using a field notebook as to its place of origin, how the sample was taken, persons performing the collection, and conditions relating to sample collection. In addition, members of the project staff working in the field operations will keep a field notebook of their project activities.

10.1.1 FIELD NOTES & DOCUMENTATION

Each sample will be documented using a field notebook as to its place of origin, how the sample was taken, persons performing the collection, and conditions relating to sample collection. In addition, members of the project staff working in the field operations will keep a field notebook of their project activities. Each sample will be documented with field sample forms attached in Appendix E.

10.2 SAMPLE HANDLING AND TRACKING SYSTEM

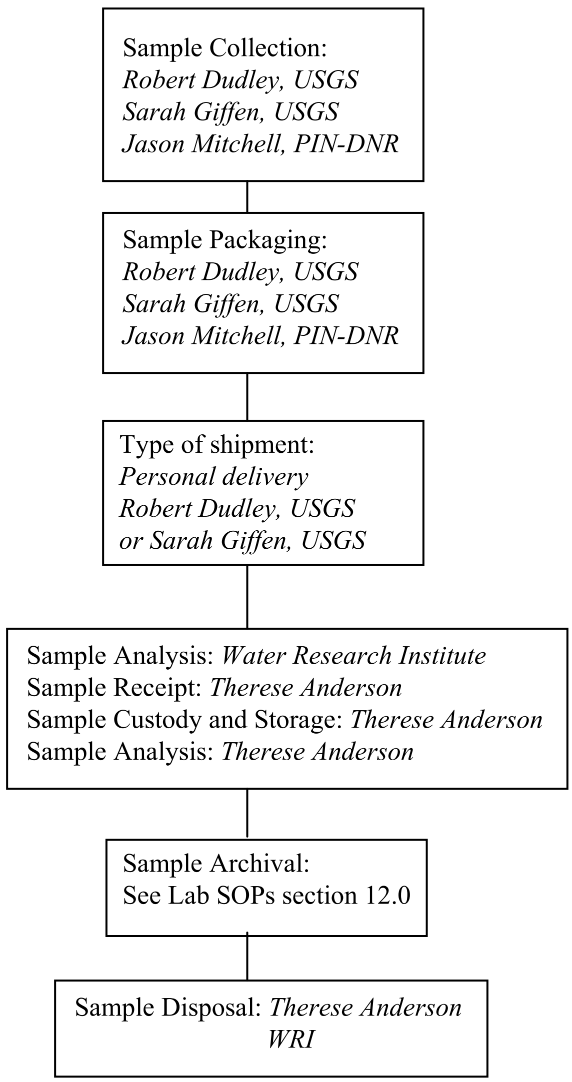
A sediment sample will have a unique ID and consist of sediment dredged from the river channel and packaged in its appropriate container. A fish tissue sample will also have a unique ID and consist of multiple fish (composite sample) of a single species wrapped in aluminum foil. Each fish within the sample will have an ID assigned to it and notes regarding its time and location of capture. For sample container, volume, and preservation see table 8.1.1, table 12.1.2 and analytical Standard Operating Procedures provided in Appendix C.

Each sample will be labeled with a unique ID and date and time of collection. packaged and sealed with a custody seal. Batches of samples transported in coolers to the lab will be accompanied by a chain of custody form to be completed upon each custody transfer until received by the lab. The custody form contains analysis requests for the samples. Sample custody form is provided in Appendix E.

Upon receipt at the laboratory, sample custody and tracking protocols will continue. For inorganic analyses, the samples will be recorded on a sample receipt form and entered into the LIMS database; while for organic analyses, the samples will be recorded into an Excel spreadsheet. Each sample will be assigned a unique laboratory ID (to be cross-referenced to the field sample ID) for sample tracking throughout sample preparation, analysis, and reporting. In addition, all samples will be frozen immediately until time for sample preparation/analysis. Bass samples will be filleted prior to freezing to ensure the integrity of the fillet and offal components for future analyses. Following analysis and data reporting, original aliquots of all samples will be archived for a minimum of one year prior to disposal by the laboratory. (See the Laboratory QA Plan, specifically Section 9.0 and Appendix B, attached as Appendix C to the QAPP.)

10.3 SAMPLE CUSTODY

FIGURE 10.3 SAMPLE HANDLING FLOW DIAGRAM



11.0 FIELD ANALYTICAL METHOD REQUIREMENTS

11.1 FIELD ANALYTICAL METHODS/STANDARD OPERATING PROCEDURES

None required. No analyses will be performed in the field for this project. Field work is limited to sample collection only.

11.2 FIELD ANALYTICAL METHODS/SOP MODIFICATIONS

None required. No analyses will be performed in the field for this project. Field work is limited to sample collection only.

11.3 FIELD ANALYTICAL INSTRUMENT CALIBRATION

None required. No analyses will be performed in the field for this project. Field work is limited to sample collection only.

11.4 FIELD ANALYTICAL INSTRUMENT/EQUIPMENT MAINTENANCE, TESTING AND INSPECTION REQUIREMENTS

None required. No analyses will be performed in the field for this project. Field work is limited to sample collection only.

11.5 FIELD ANALYTICAL INSPECTION AND ACCEPTANCE REQUIREMENTS FOR SUPPLIES

None required. No analyses will be performed in the field for this project. Field work is limited to sample collection only.

12.0 FIXED LABORATORY ANALYTICAL METHOD REQUIREMENTS

12.1 FIXED LABORATORY ANALYTICAL METHODS AND STANDARD OPERATING PROCEDURES

TABLE 12.1.1 SEDIMENT AND FISH ANALYTICAL PROTOCOLS[1]

SOP Reference Number	Fixed Laboratory	Title, Revision Date and/or Number	Definitive or Screening Data	Analytical Parameter	Matrix	Instrument
SOP-1	WRI	Sample storage, grinding, & compositing Rev. 5 6/27/00	NA	PCBs, PCDDs, & PCDFs	Tissue	Blender
SOP-2	WRI	Gel-permeation cleanup (EPA 3640A) Rev. 4 6/9/00	NA	PCBs, PCDDs, & PCDFs	Tissue & sediment	GPC
SOP-3	WRI	Florisil cleanup (EPA 3620B) Rev. 4 6/8/00	NA	PCBs, PCDDs, & PCDFs	Tissue & sediment	Pre-packed glass SPEs
SOP-4[2]	WRI	Polychlorinated biphenyls in solid matrices by capillary gas chrom-atography - electron capture detector and/or mass spectrometry Rev. 7 6/29/00	Definitive	PCB Homologues	Tissue & sediment	GC-ECD extraction with microwave

1: See SOP's in Appendix C
2: Modification to SOP – include surrogates

TABLE 12.1.1 SEDIMENT AND FISH ANALYTICAL PROTOCOLS –CONT-

SOP Reference Number	Fixed Laboratory	Title, Revision Date and/or Number	Definitive or Screening Data	Analytical Parameter	Matrix	Instrument
SOP-5	WRI	Toxic polychlorinated biphenyls by isotope dilution and high-resolution gas chromatography/high resolution mass spectrometry (HRGC/HRMS) (EPA 1668) Rev.7 7/6/00 Modification to SOP - add PCB-81	Definitive	PCBs Coplanar	Tissue & sediment	GC & HRMS
SOP-6	WRI	Tetra- through octa- chlorinated dioxins and furans by isotope dilution high resolution gas chromatography/high resolution mass spectrometry (HRGC/HRMS) (EPA 1613) Rev. 8 7/6/00	Definitive	PCDDs & PCDFs	Tissue & sediment	GC & HRMS

TABLE 12.1.1 SEDIMENT AND FISH ANALYTICAL PROTOCOLS –CONT-

SOP Reference Number	Fixed Laboratory	Title, Revision Date and/or Number	Definitive or Screening Data	Analytical Parameter	Matrix	Instrument
SOP-7[3]	WRI	Determination of total organic carbon in sediments using elemental analysis Rev. 7 6/30/00	Definitive	TOC	sediment	LECO CN-2000 Carbon & Nitrogen Analyzer
SOP-8	WRI	Determination of grain size of sediments using a rapid sediment analyzer settling column Rev. 9 8/6/00	Definitive	Grain Size	sediment	Rapid sediment analyzer settling column

3: Modification to SOP – use different calibration standard

TABLE 12.1.2 REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES[1,2]

Parameter Soil/Sediment Samples	Analytical Reference	Sample Container	Sample Volume	Preservation	Maximum Holding Time
PCB Congeners	SOP-5	Widemouth amber glass with Teflon lined caps 500 ml size	500 ml to be collected and placed in 500ml jar	cool, 4 deg C	Extract and analyze within one year of sample collection
PCB Homologues	SOP-4	same container as above	500 ml to be collected and placed in 500ml jar	cool, 4 deg C	same as above
PCDDs/PCDFs	SOP-6	same container as above	500 ml to be collected and placed in 500ml jar	cool, 4 deg C	Extract and analyze within one year of sample collection
TOC	SOP-7	Widemouth clear glass with Teflon lined caps 1 liter size	500 ml to be collected and placed in 1 L jar	cool, 4 deg C	Extract and analyze within one year of sample collection
Fractionation	SOP-8	same container as above	500 ml to be collected and placed in 500ml jar	cool, 4 deg C	Extract and analyze within one year of sample collection
Fish Tissue Samples					
PCB Congeners	SOP-5	aluminum foil and ziploc bags	3-5 indiv. For bass 8-10 indiv, for sucker	cool, 4 deg C	Extract and analyze within one year of sample collection
PCB Homologues	SOP-4	aluminum foil and ziploc bags	3-5 indiv. For bass 8-10 indiv, for sucker	cool, 4 deg C	same as above
PCDDs/PCDFs	SOP-6	aluminum foil and ziploc bags	3-5 indiv. For bass 8-10 indiv, for sucker	cool, 4 deg C	Extract and analyze within one year of sample collection
Grinding/Storage	SOP-1	aluminum foil and ziploc bags	3-5 indiv. For bass 8-10 indiv, for sucker	cool, 4 deg C	Extract and analyze within one year of sample collection

1 The term “PCB Congeners” is used synonymously with the term “coplanar PCBs” and the term “PCB Homologues” is used synonymously with the term “total PCBs” throughout the QAPP.
2 The term “Fractionation” is used synonymously with the term “grain size” throughout the QAPP

TABLE 12.1.2 REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES –CONT-[1]

Parameter Equip. Blank	Analytical Reference	Sample Container	Sample Volume	Preservation	Maximum Holding Time
PCB Congeners	SOP-5	Widemouth amber glass with Teflon lined caps 1 L size	1 Liter of water and placed in 1 L jar	cool, 4 deg C	Extract and analyze within one year of sample collection
PCB Homologues	SOP-4	Widemouth amber glass with Teflon lined caps 1 L size	1 Liter of water and placed in 1 L jar	cool, 4 deg C	Extract and analyze within one year of sample collection
PCDDs/PCDFs	SOP-6	Widemouth amber glass with Teflon lined caps 1 L size	1 Liter of water and placed in 1 L jar	cool, 4 deg C	Extract and analyze within one year of sample collection

Note regarding Holding times:
All samples will be delivered to the laboratory within 48 hours of collection, where they will be frozen until sample preparation/analysis.
The holding time from sample collection to analysis will not exceed one year

1 The term “PCB Congeners” is used synonymously with the term “coplanar PCBs” and the term “PCB Homologues” is used synonymously with the term “total PCBs” throughout the QAPP.

12.2 FIXED LABORATORY ANALYTICAL METHOD/SOP MODIFICATIONS

Modifications to the laboratory analytical methods/Standard Operating Procedures can be made by the analyzing laboratory. The Laboratory Manager will provide the proposed modifications to the Project QA Officer who will submit the proposed modifications to appropriate QA/QC reviewers for approval.

12.3 FIXED LABORATORY INSTRUMENT CALIBRATION

See Table 13.2.1 and laboratory analytical methods/Standard Operating Procedures in Appendix C.

12.4 FIXED LABORATORY INSTRUMENT/EQUIPMENT MAINTENANCE, TESTING AND INSPECTION REQUIREMENTS

TABLE 12.4.1 GC/MS ROUTINE MAINTENANCE PROCEDURES AND SCHEDULES

Instrument	Maintenance Procedures/Schedules	Spare Parts
Gas Chromotaograph/ Mass Spectrometer (GC/MS)	1. Replace pump oil as needed 2. Change septa weekly or as often as needed 3. Change gas line dryers as needed 4. Replace electron multiplier as often as needed 5. Replace glass jet splitter as often as needed 6. Replace GC injector glass liner weekly or as often as needed 7. Cut off front end of the guard or column or replace GC column as often as needed 8. Check to ensure the gas supply is sufficient for the day's activity and is described in the SOP 9. Check to ensure the pressure on the primary regulator never runs below 100 psi 10. Clean the MSD (ion source) as needed or when the tune criteria are not met	1. Syringes 2. Septa 3. Various electronic components 4. GC column 5. Glass liner

ECD ROUTINE MAINTENANCE

Analysts should perform routine maintenance including but not limited to, replacing the septa, changing the inlet liner and clipping the injector end of the column to remove high-boiling materials and active sites. If contamination is still present then cleaning of the metal parts of the injector with methanol or another appropriate solvent may be necessary. Cool the injector port to room temperature and remove the column, septa and liner. Using a cotton-tipped swap saturated with the cleaning solvent, clean all internal surfaces of the injection port. Allow to dry and reassemble the inlet. If this does not take care of the contamination, install a new column. Care must be taken that air does not enter the ECD while it is hot. This can oxidize the reactive surface and decrease detection limits. Prior to all maintenance, except changing the septa, the ECD must be cooled to <100°C.

SEDIMENT FRACTIONATION SETTLING TUBE MAINTENANCE

Algae growth on the walls is controlled by 10 gm of sodium azide added with each tube fill. Sand buildup on the pan is dumped into the lower trap box every 5-10 runs. Each morning, or as needed, the tube is filled with water to the calibration line (2 meters above the pan) to replace evaporation. The tube is flushed and refilled with tap water if cloudiness or algae buildup is noted. Annually, the tube is flushed from the bottom drain to remove sediment in the trap box below the hanging pan. The Mettler balance is serviced and calibrated annually by a professional balance technician.

LECO CN-2000 MAINTENANCE INCLUDE:

<u>Daily:</u> Visual inspection of filters, dusting off boat drop area of the autoloader, and cleaning as necessary (depending on condition) touch screen on main unit.

<u>Every 100 samples:</u> Replace as necessary (depending on type of sample analyzed) primary furnace filter tube. Clean or replace push road O-ring.

<u>Every 600-650 samples:</u> Repack helium flow reagent tube and measure flow reagent tube, replace as necessary (depending on type of sample analyzed) secondary furnace filter tube, clean screen filters.

<u>Every 1000 samples:</u> Clean ballast tank, replace disposable particle filter, clean aliquot dose valve and replace O-rings as necessary. Inspect and replace as necessary pinch valve tubing.

Monthly: Clean fan filters.

About every six months or when it is suspected of being a cause of a leak, the outer combustion tube is being inspected, cleaned and if necessary replaced. During replacement of the outer combustion tube, the inner combustion tube and lance are being inspected for cracks or holes. If cracks or holes are present, the inner combustion tube and/or lance are being replaced.

12.5 FIXED LABORATORY INSPECTION AND ACCEPTANCE REQUIREMENTS FOR SUPPLIES

See Section 13.11 of the Laboratory QA Plan, as included in Appendix C.

13.0 QC REQUIREMENTS

13.1 SAMPLING QC

See Table 13.2.1.

13.2 ANALYTICAL QC

See Table 13.2.1.

TABLE 13.2.1 ANALYTICAL MEASUREMENTS QUALITY CONTROL REQUIREMENTS

Parameter	SOP Reference	Field/Lab Requirement	QC Check	Data Quality Indicator	Frequency	Acceptance Criteria	Corrective Action
PCB Homologues (For both fish tissue and sediment)	SOP-4 (GC-ECD only)	Field Sampling	Field Duplicate	Precision	1/15 samples (sediment) 1/4 small-mouth bass fillet 1/4 small-mouth bass offal 1/4 white sucker	RPD <=75%	n/a
			Equipment Blank (sediment only)	Contamination (Accuracy/Bias)	1/32 samples	< PQL (Project Quantitation Limit)	n/a
		Laboratory	Initial Calibration (external)	Accuracy	5-point calibration for all analytes prior to sample analysis	RSD<=25% for all compounds	1. Evaluate 2. Recalibrate when QC criterion not met
			Identification/Retention Times/Ion Ratios/Signal to Noise/Interferences	Accuracy	See SOP	See SOP	1. Evaluate 2. Rerun as necessary
			Continuing Calibration Verification	Accuracy	Daily before sample analysis, every 12h of analysis time, and at end of daily run	RF difference <= 25% between initial and continuing	1. Evaluate 2. Repeat initial calibration when QC criterion not met
			Method Blank	Contamination (Accuracy/Bias)	1/batch/matrix or 1/20 samples whichever is more frequent	<PQL	1. Determine source of contamination 2. Eliminate contaminant source 3. Rerun batch as necessary
			Surrogates	Bias	Every sample	+/- 50% of known value	1. Re-extract sample and re-analyze 2. If fails again, the compound associated with the surrogate is flagged
			Standard Reference Material (SRM)	Bias	1/batch/matrix or 1/20 samples whichever is more frequent	Dependent upon SRM source	1. If value falls out out of certified range, batch data is flagged 2. For SRM compounds with values that are reference not certified, the data will not be flagged, but narrated in notes
			Reagent Blanks	Contamination (Accuracy/Bias)	Initial and every 12h of analysis time	<PQL	1. Determine source of contamination & eliminate (do not proceed with analy-ses until system is clean) 3. Reanalyze samples as necessary
			Matrix Spike	Bias	1/batch/matrix or 1/20 samples whichever is more frequent	Recovery of 70-130% of known spike	1. Re-extract sample and re-analyze 2. If still outside criteria, report
			Matrix Spike Duplicate	Precision	1/batch/matrix or 1/20 samples whichever is more frequent	RPD<=30%	1. Re-extract sample and re-analyze 2. If still outside criteria, report
			Laboratory Control Sample	Bias	1/batch/matrix or 1/20 samples whichever is more frequent	Recovery of 70-130% of known value	1. Re-extract sample and re-analyze 2. If still outside criteria, report

TABLE 13.2.1 ANALYTICAL MEASUREMENTS QUALITY CONTROL REQUIREMENTS –CONT-

Parameter	SOP Reference	Field/Lab Requirement	QC Check	Data Quality Indicator	Frequency	Acceptance Criteria	Corrective Action
PCB Coplanars (For both fish tissue and sediment)	SOP-5	Field Sampling	Field Duplicate	Precision	1/15 samples (sediment) 1/4 small-mouth bass fillet 1/4 small-mouth bass offal 1/4 white sucker	RPD <=75%	n/a
			Equipment Blank (sediment only)	Contamination (Accuracy/Bias)	1/32 samples	<PQL	n/a
		Laboratory	System Performance Check	Sensitivity	Refer to SOP	Refer to SOP	1. Evaluate 2. Rerun as necessary
			Mass Spectrometer Tune	Accuracy	Refer to SOP	Refer to SOP	1. Evaluate 2. Retune instrument, verify
			Initial Calibration	Accuracy	5-point calibration for all analytes prior to sample analysis	RSD <= 20% for all compounds	1. Evaluate 2. Recalibrate when QC criterion not met
			Identification/Retention Times/Ion Ratios/Signal to Noise/Interferences	Accuracy	Refer to SOP	See SOP	1. Evaluate 2. Rerun as necessary
			Continuing Calibration Verification	Accuracy	Daily before sample analysis and every 12h of analysis time	RF difference <= 20% between initial and continuing	1. Evaluate 2. Repeat initial calibration when QC criterion not met
			Method Blank	Contamination (Accuracy/Bias)	1/batch/matrix or 1/20 samples whichever is more frequent	< PQL	1. Determine source of contamination 2. Eliminate contaminant source 3. Re-extract and reanalyze as necessary
			Surrogates	Bias	Every sample	Refer to SOP	1. Re-extract sample and re-analyze as necessary 2. If still outside criteria, report
			Standard Reference Material (SRM)	Bias	1/batch/matrix or 1/20 samples whichever is more frequent	Dependent upon SRM source	1. If value falls out out of certified range, batch data is flagged 2. For SRM compounds with values that are reference not certified, the data will not be flagged, but narrated in notes
			Matrix Spike	Bias	1/batch/matrix or 1/20 samples whichever is more frequent	Recovery of 70-130% of known spike	1. Re-extract sample and re-analyze 2. If still outside criteria, report
			Matrix Spike Duplicate	Precision	1/batch/matrix or 1/20 samples whichever is more frequent	RPD<50%	1. Re-extract sample and re-analyze 2. If still outside criteria, report
			Laboratory Control Sample	Bias	1/batch/matrix or 1/20 samples whichever is more frequent	Recovery of 70-130% of known spike	1. Re-extract sample and re-analyze 2. If still outside criteria, report

TABLE 13.2.1 ANALYTICAL MEASUREMENTS QUALITY CONTROL REQUIREMENTS –CONT-

Parameter	SOP Reference	Field/Lab Requirement	QC Check	Data Quality Indicator	Frequency	Acceptance Criteria	Corrective Action
PCDD's & PCDF's (For both fish tissue and sediment)	SOP-6	Field Sampling	Field Duplicate	Precision	1/15 samples (sediment) 1/4 small-mouth bass fillet 1/4 small-mouth bass offal 1/4 white sucker	RPD <=75%	n/a
			Equipment Blank (sediment only)	Contamination (Accuracy/Bias)	1/32 samples	<PQL	n/a
		Laboratory	Matrix spike	Bias	1/batch/matrix or 1/20 samples whichever is more frequent	Recovery of 70-130% of known spike	1. Re-extract sample and re-analyze 2. If still outside criteria, report
			Mass spectrometer tune	Accuracy	Refer to SOP	Refer to SOP	1. Evaluate 2. Retune instrument, verify
			Identification/Retention Times/Ion Ratios/Signal to Noise/Interferences	Accuracy	Refer to SOP	See SOP	1. Evaluate 2. Rerun as necessary
			Initial calibration	Accuracy	5-point calibration for all analytes prior to sample analysis	RSD <= 20% for all compounds	1. Evaluate 2. Recalibrate when QC criterion not met
			System performance check	Sensitivity	Refer to SOP	Refer to SOP	1. Evaluate 2. Rerun as necessary
			Surrogate	Bias	Every sample	Refer to SOP	1. Re-extract sample and re-analyze as necessary 2. If still outside criteria, report
			Continuing Calibration Verification	Accuracy	Daily before sample analysis and every 12h of analysis time	RF difference <= 30% between initial and continuing	1. Evaluate 2. Repeat initial calibration when QC criterion not met
			Method Blank	Contamination (Accuracy/Bias)	1/batch/matrix or 1/20 samples whichever is more frequent	<PQL	1. Determine source of contamination 2. Eliminate contaminant source 3. Re-extract and reanalyze as necessary
			Standard Reference Material (SRM)	Bias	1/batch/matrix or 1/20 samples whichever is more frequent	Dependent upon SRM source	1. If value falls out out of certified range, batch data is flagged 2. For SRM compounds with values that are reference not certified, the data will not be flagged, but narrated in notes
			Matrix Spike Duplicate	Precision	1/batch/matrix or 1/20 samples whichever is more frequent	RPD<50%	1. Re-extract sample and re-analyze 2. If still outside criteria, report
			Laboratory Control Sample	Bias	1/batch/matrix or 1/20 samples whichever is more frequent	Recovery of 70-130% of known spike	1. Re-extract sample and re-analyze 2. If still outside criteria, report

TABLE 13.2.1 ANALYTICAL MEASUREMENTS QUALITY CONTROL REQUIREMENTS –CONT-

Parameter	SOP Reference	Field/Lab Requirement	QC Check	Data Quality Indicator	Frequency	Acceptance Criteria	Corrective Action
TOC (sediment only)	SOP-7	Field Sampling	Field Duplicate	Precision	1/15 samples	RPD <=75%	n/a
		Laboratory	Pre-analysis instrument blank	Contamination (Accuracy/Bias)	Prior to analysis	< PQL (DL is 0.01%)	1. Flush supply lines and chambers 2. Run additional blanks as necessary
			Linear Dynamic Range (LDR) Initial Calibration	Accuracy	Pre-established by manufacturer	n/a	n/a
			Linear Dynamic Range (LDR) Calibration Check	Accuracy	Daily	+/- 40% of true value of guaranteed analysis for carbon as calculated from analysis of three different amounts of material	1. Correct for drift with EDTA std. 2. Rerun calibration check 3. If results still not within acceptance range, replace steel wool filter and rerun calibration check 4. If results still not within acceptance range, shut down and contact manufacturer as necessary
			Quality Control Sample (QCS) as Standard Reference Material (SRM)	Bias	Beginning, middle, and end of every analytical run (10 samples)	within +/-5% of stated value	Initial QCS: 1. Determine source of prob-lem, correct, and reanalyze QCS 2. If still not within acceptance range, recalibrate Mid and Final QCS: 1. Recalibrate and reanalyze associated samples as necessary
			Duplicate sample (DUP)	Precision	Every 10 samples	within +/-5% of original sample	1. Reanalyze. If still not within acceptance range, reanalyze using a larger sample as necessary

TABLE 13.2.1 ANALYTICAL MEASUREMENTS QUALITY CONTROL REQUIREMENTS –CONT-

Parameter	SOP Reference	Field/Lab Requirement	QC Check	Data Quality Indicator	Frequency	Acceptance Criteria	Corrective Action
Grain Size (sediment only)	SOP-8	Field Sampling	Field Duplicate	Precision	1/15 samples	mean grain size and variance: RPD <=50% Sample weights of individual fractions: RPD <= 50%	n/a
		Laboratory	Method Blank (0.5% Calgon solution)	Contamination (Accuracy/Bias)	every 10 samples	<0.01 grams total	1. Flush system and reanalyze
			Water Temperature Check	Accuracy	every sample	+/- 1 degree Celcius for three thermometers	wait until temperature equilibrates prior to analysis
			Pre-analysis instrument calibration check	Accuracy	5 times prior to analyses	within 5% for mean grain size and variance	1. Reananlyze standard
			Duplicate samples	Precision	Every 5 samples	within 5% for mean grain size and variance	1. Reanalyze samples as necessary
			Standard Reference Material (SRM)	Bias	Every 20 samples	within 5% for mean grain size and variance	1. Reanalyze samples as necessary
			Internal losses check due to tension, leakage, or density variations	Accuracy	each sample	<5% weight loss	1. Reanalyze samples as necessary

14.0 DATA ACQUISITION REQUIREMENTS

As early as 1989, the US-Environmental Protection Agency (US-EPA) and the Penobscot Indian Nation (PIN) reported separate investigations of Penobscot River contamination by selected contaminants, included dioxins and furans. The State of Maine's Dioxin Monitoring Program, established in 1988 has annually measured levels of dioxins in fish, wastewaters, sludges and effluents in the state of Maine, including fish from the Penobscot River. For the last 16 years the State of Maine's Surface Water Ambient Toxic (SWAT) Monitoring program has investigated levels of a variety of organic and inorganic contaminants. Contaminant analysis has been conducted at the Midwest Research Institute's Chemical Sciences Department and over the last several years at the Maine Water Research Institute-University of Maine. In addition to the monitoring programs, several biological opinions have been written concerning the impact of dioxin-like chemicals in Maine. The Maine Department of Environmental Protection data indicate that levels of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) in fish (sucker) sampled at Veazie on the Penobscot River have declined from 7.5ppt in 1984-1986 to 1.1ppt in 1999. Levels of TCDD in Veazie suckers remained at the 1ppt level during the period from 1997 to 1999. Detailed information about contaminants of interest and studied sites are available in the references listed below.

The usability of the data presented in these documents is currently unknown. Due to the nature of the associated studies, it was not necessary to conduct them under an EPA-approved QAPP; and, any associated project-specific sampling & analysis documents that may have been generated to support them have not been reviewed by any member of the project team to date. However, prior to use of this data in supplementing that currently being generated for the ecological risk assessment and human health consult, this secondary data will be reviewed to determine any data use limitations (based on such items as sample collection methodologies, analytical procedures, and data validation/evaluation/qualification efforts).

Information (studies/reports) Related to Contamination of 2,3,7,8-substituted Polychlorinated Dibenzo-p-dioxins and Dibenzofurans in Maine, including the Penobscot River:

Mower, B., 2000. Dioxin Monitoring Program, State of Maine 1999. Department of Environmental Protection, Augusta, Maine.

Mitnik, P.E., 2000, Penobscot River Modeling Report, State of Maine. Department of Environmental Protection, Augusta, Maine.

DEP, 2000. 1999 Surface Water Ambient Toxic Monitoring Report, Final Data Report, Maine Department of Environmental Protection, Augusta, Maine. In Press.

Giesy, J.P. 2000. April 12, 2000 comments on the USFWS draft biological opinion on the effect of issuance of NPDES permits on bald eagles in Maine.

Ogden. 2000. Review of Scientific Issues Raised by the United States Fish and Wildlife Service's Draft Biological Opinion on the Effects and Issuance of NPDES Permits on Bald Eagles in Maine. Ogden Environmental and Energy Services, Westford, MA. April 12, 2000.

Mower, B., 1999. Dioxin Monitoring Program, State of Maine 1998. Department of Environmental Protection, Augusta, Maine

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1998 Surface Water Ambient Toxic Monitoring Report, Final Data Report, Maine Department of Environmental Protection, Augusta, Maine.

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U.S. FWS. 1996. Biological Opinion on the effects of the proposed NPDES permit for Lincoln Pulp and Paper Company, Inc. on the bald eagle. New England Field Office. Concord, New Hampshire.

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ENSR. 1995.Comments on the USFW Draft Biological Opinion on the Effect of Lincoln Pulp and Paper Co. Wastewater Discharge on Bald Eagles. ENSR Consulting and Engineering. November 1995. Document Number 8505-305-500, 548004CP.AP.

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Welch, L.J. 1994. Contaminant Burdens and Reproductive Rates of Bald Eagles Breeding in Maine. MS. Thesis. University of Maine.

Mower, B., 1993. Dioxin Monitoring Program, State of Maine 1992. Department of Environmental Protection, Augusta, Maine.

Mower, B., 1992. Dioxin Monitoring Program, State of Maine 1991. Department of Environmental Protection, Augusta, Maine.

Mower, B., 1991. Dioxin Monitoring Program, State of Maine 1988-90. Department of Environmental Protection, Augusta, Maine.

Opperhuizen, A. and D.T.H.M. Sijm. 1990. Bioaccumulation and biotransformation of polychlorinated dibenzo-p-dioxins and dibenzofurans in fish. Env. Tox. And Chem., 9:175-186.

Frakes, R.A. 1990. Health-based water quality criteria for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). Maine Department of Human Services, Bureau of Health, Augusta, Maine.

Penobscot Nation, 1989. "Summary Report: Levels of Selected Contaminants in Tissue from Smallmouth Bass and White Suckers Collected from the Penobscot River, 1988."

US EPA, 1989. "The National Dioxin Study, Tiers 3,5,6, and 7."

15.0 DOCUMENTATION, RECORDS AND DATA MANAGEMENT

15.1 PROJECT DOCUMENTATION AND RECORDS

All activities will be documented according to Standard Operating Procedures and according to field and laboratory data sheets. Variances from Standard Operating Procedures will be documented and reported following the communication pathways noted in section 4.1.1. Adequate documentation will be provided to ensure that the data obtained by sampling and analyses are useable, justifiable, and in agreement with the field and analytical requirements of the project. Each sample will be documented using a field notebook and/or sampling field forms as to its place of origin, how the sample was taken, persons performing the collection, and conditions relating to sample collection. In addition, members of the project staff working in the field operations will keep their own notes of their project activities.

15.2 FIELD ANALYSIS DATA PACKAGE DELIVERABLES

There are no field analyses to be performed for this project.

15.3 FIXED LABORATORY DATA PACKAGE DELIVERABLES AND DATA REPORTING FORMATS

The data package deliverables for each part of the analyses being conducted for the current project is provided in Appendix F. A complete data package ensures that data can be properly validated in accordance with criteria specified in Table 19.0. Data deliverable worksheets are included in Appendix B of the Laboratory QA Plan (included as Appendix C of this document).

15.4 DATA HANDLING MANAGEMENT

Each sample will be documented using a field notebook as to its place of origin, how the sample was taken, persons performing the collection, and conditions relating to sample collection. In addition, members of the project staff working in the field operations will keep a field notebook of their project activities. Each sample will be documented with field sample forms attached in Appendix F.

A sediment sample will have a unique ID and consist of sediment dredged or cored from the river channel and packaged in its appropriate container. A fish tissue sample will also have a unique ID and consist of multiple fish (composite sample) of a single species wrapped in tin foil and double bagged in ziploc bags. Each fish within the sample will have an ID assigned to it and notes regarding its time and location of capture. For sample container, volume, and preservation see sampling and lab Standard Operating Procedures sections 9.0 and 12.0 and Appendix C.

Each sample will be labeled with a unique ID and date and time of collection. packaged and sealed with a custody seal. Batches of samples transported in coolers to the lab will be accompanied by a chain of custody form to be completed upon each custody transfer until received by the lab. The custody form contains analysis requests for the samples. Sample custody form is provided in Appendix F.

At the laboratory, the sample receipt form and LIMS database will serve as the extension of the field custody form for samples received for inorganic analyses. The Excel spreadsheet generated upon sample receipt will serve the same purpose for samples received for organic analyses. These mechanisms will track the samples and the associated data generated from receipt of samples through sample preparation, analysis, and reporting. Additional laboratory tracking will be documented on forms included in the laboratory QA Plan Appendix B, as well as in logbooks maintained for the various extractions and analyses. Copies of these logbook pages, spreadsheets, and all other raw data, will be compiled with the final data included in individualized data summary forms designed for each project-specific analysis. The completed laboratory reports will be reviewed for transposition and transcription errors. The data will be stored on standardized forms on PC hard drives, routinely backed up on additional media. Good Automated Laboratory Practices will be followed to ensure the security of the data, generated and stored. (See the Laboratory QA Plan, specifically Sections 9.0 & 12.0 and Appendix B, attached as Appendix C to the QAPP.)

15.5 DATA TRACKING AND CONTROL

All samples and sample integrity will be accounted for by chain of custody forms and custody seals. All forms specified in sections 10.0 and 15.1 will be filled out and archived upon transfer of samples to the lab. All data will be reported to the USGS Project Manager. All data will be stored in the USGS database specifically designed for this project. For terms of release of data to the public, see section 4.1.1.

Data tracking and control procedures to be followed at the laboratory are summarized in Section 15.4 Data Handling Management.

16.0 ASSESSMENTS AND RESPONSE ACTIONS

16.1 PLANNED ASSESSMENTS

Field Methods/Procedures

The USGS Project Manager will perform assessments of the field sampling methodology and field analytical measurements during the first week of the field activities. Due to the fact that the sediment sampling and fish sampling will not be taking place at the same time, separate assessments will be made for these activities. The USGS Project Manager will perform an assessment at the start of the sediment sampling activities and the USGS Project Manager will perform another assessment at the start of the fish sampling activities. If the USGS Project Manager is unable to perform these assessments, then the USGS Project Manager will be responsible for appointing another qualified person as a substitute.

16.2 ASSESSMENT FINDINGS AND CORRECTIVE ACTION RESPONSES

Field Methods/Procedures

All assessment findings and corrective action responses will be communicated verbally. Any deficiencies identified by the USGS Project Manager in field sampling methodology will be communicated verbally to the persons performing these field tasks and the proper techniques will be demonstrated in the field. If the USGS Project Manager is unable to perform these assessments, then the USGS Project Manager will be responsible for appointing another qualified person as a substitute.

16.3 ADDITIONAL QAPP NON-CONFORMANCES

Field Methods/Procedures

Any non-conformance with the field plan or sampling protocols will be reported by the USGS Field Sampling Leader to the USGS Project Manager. Any deficiencies identified by the USGS Project Manager will be corrected and communicated to the Lead Organization Project Manager and the EPA Project Manager as needed. See also sections 4.1.1 and 4.1.2.

17.0 QA MANAGEMENT REPORTS

TABLE 17.0 QA MANAGEMENT REPORTS

Type of Report	Frequency of Report	Projected Delivery Dates	Person(s) Responsible for Report Preparation	Report Recipient(s)
Verbal or written status report	As necessary	As Necessary	Robert Lent, USGS Project Manager, USGS Therese Anderson, Laboratory Manager, WRI	Allen Sedik, Project Manager, BIA Valerie Ferry, Project Manager, EPA Pat Svetaka, Project QA Officer, EPA
Data assessment reports	For each data package generated by lab	35 days following receipt of data from lab	Robert W. Dudley, Field Team Leader Steve Stadola, EPA Data Validator Coordinator	Allen Sedik, Project Manager, BIA Valerie Ferry, Project Manager, EPA Pat Svetaka, Project QA Officer, EPA
Final Data report	Once as draft Once as final publication	30 days following data validation	Robert W. Dudley, Field Team Leader	Allen Sedik, Project Manager, BIA Valerie Ferry, Project Manager, EPA Pat Svetaka, Project QA Officer, EPA

See section 6.2 for project schedule and specific dates.

18.0 VERIFICATION AND VALIDATION REQUIREMENTS

See section 19.0.

19.0 VERIFICATION AND VALIDATION PROCEDURES

TABLE 19.0 DATA VALIDATION SUMMARY

Data Validation Summary Table

Medium/ Matrix	Analytical Parameter	Concentration Level	Validation Criteria	Validation Criteria Modified	Data Validation Tier Level	Modified Tier Level Used	Data Validator	Responsibility for Data Validations
Sediment	Dioxin/ Furans	Low/Medium	Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, 12/96 and EPA Region I SOP for Dioxin Data Validation, ESAT-01-0007, 11/20/98 or most current version	No	III	No	ESAT Lockheed Environmental Services and Technologies Co. Bedford, MA 01730, Tel. 781-275-7868	Steve Stadola, Chemist, Region I, EPA-NE, Lexington, MA 02173 Tel. 781-860-4634
Fish	Dioxin/ Furans	Low/Medium	Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, 12/96 and EPA Region I SOP for Dioxin Data Validation, ESAT-01-0007, 11/20/98 or most current version	No	III	No	ESAT Lockheed Environmental Services and Technologies Co. Bedford, MA 01730, Tel. 781-275-7868	Steve Stadola, Chemist, Region I, EPA-NE, Lexington, MA 02173 Tel. 781-860-4634
Sediment	PCBs	Low/Medium	EPA Region I, Toxic PCB Congeners and Homologue Data Validation SOP, ESAT01-0008, 7/31/98 or most current version	No	III	No	ESAT Lockheed Environmental Services and Technologies Co. Bedford, MA 01730, Tel. 781-275-7868	Steve Stadola, Chemist, Region I, EPA-NE, Lexington, MA 02173 Tel. 781-860-4634
Fish	PCBs	Low/Medium	EPA Region I, Toxic PCB Congeners and Homologue Data Validation SOP, ESAT01-0008, 7/31/98 or most current version	No	III	No	ESAT Lockheed Environmental Services and Technologies Co. Bedford, MA 01730, Tel. 781-275-7868	Steve Stadola, Chemist, Region I, EPA-NE, Lexington, MA 02173 Tel. 781-860-4634

Table 19.0 Data Validation Summary -cont.-

Data Validation Summary Table

Medium/ Matrix	Analytical Parameter	Concentration Level	Validation Criteria	Validation Criteria Modified	Data Validation Tier Level	Modified Tier Level Used	Data Validator	Responsibility for Data Validations
Sediment	TOC	n/a	See data evaluation/documentation form in Appendix G	No	II	No	USGS 26 Ganneston Drive Augusta, ME 04330 207-622-8201	Robert W. Dudley 26 Ganneston Drive Augusta, ME 04330 207-622-8201
Sediment	Grain Size (fractionation)	n/a	See data evaluation/documentation form in Appendix G	No	II	No	USGS 26 Ganneston Drive Augusta, ME 04330 207-622-8201	Robert W. Dudley 26 Ganneston Drive Augusta, ME 04330 207-622-8201

20.0 DATA USABILITY/RECONCILIATION WITH PROJECT QUALITY OBJECTIVES

The following products will result from the field work component of this study (to be assembled by USGS):

1. Riverbed sediment characterization map accompanied by a sediment narrative report: The riverbed sediment map and report will illustrate and describe the locations of all river-channel sediment types surveyed in the study area.

2. Sediment and fish tissue chemical data report: The report will summarize laboratory data obtained from the analyses of sediment and fish tissue sampling for dioxins, furans, PCBs, TOC and grain size and describe the occurrence and distribution of the chemical constituents in the study area.

The chemical data will be used to provide a data report summarizing field and laboratory data obtained from the field sample collection and chemical analysis of sediments and fish tissue on the occurrence and distribution for dioxins, furans and PCBs in the study area.

The following products will result from the Quality Assurance component of this study (to be assembled by EPA risk assessors):

The quality assurance objectives for both the ecological and human health risk assessments will be examined to determine if the objectives were met. The data useability examination will consist of a comparison assessment of the results of each analysis against the specified objectives. This examination will consist of evaluating the overall measurement errors associated with the project and include the following data quality indicators: precision, accuracy/bias, sample representativeness, sensitivity and quantitation limits, completeness, comparability and data limitations and actions. Based on the results of this evaluation, the quality of the data obtained from each evaluation will be determined. The risk assessors will determine whether the project objectives have been met based on the overall data quality and useability.

The screening level ecological risk assessment will include a data useability summary. The data useability summary will identify the strengths and limitations of the reconciliation of the project objectives. Based on the overall results of the data summary, the risk assessor will use their professional judgement to include other pertinent field or laboratory parameters that could be used to determine whether data are of the right type, quality and quantity to support the evaluation of potential risk to ecological receptors.

The human health assessor will consider the original Data Quality Objectives, the sampler's Trip Report, the data validation memo and information provided by the chemist, hydrogeologist and field sampler to assess the useability of the data for use in the human health evaluation. The assessor will review the data validation report (especially data reported as "J") to assess any limitations on the use of the data and the stated Data Quality Objectives. The field sampler's trip report will be evaluated to assess any limitations on the usability of the data due to the original sampling methodology selected or any problems or modifications made from the approved field sampling protocols. In addition, field conditions, sampling problems and field QC data will be assessed for impact on the data useability.